

The British Institute of Persian Studies
Archaeological Monographs Series I



SIRAF

HISTORY, TOPOGRAPHY AND ENVIRONMENT

David Whitehouse

with contributions by

Donald S. Whitcomb and T. J. Wilkinson



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BIPS

The British Institute of Persian Studies

Oxbow Books
Oxford and Oakville

Published by
Oxbow Books, Oxford

© Oxbow Books 2009

ISBN 978-1-84217-394-7

A CIP record for this book is available from the British Library

This book is available direct from

Oxbow Books, Oxford, UK
(*Phone: 01865-241249, Fax: 01865-794449*)

and

The David Brown Book Company
PO Box 511, Oakville, CT 06779, USA
(*Phone: 860-945-9329; Fax: 860-945-9468*)

or from our website

www.oxbowbooks.com

Whitehouse, David, 1941-

Siraf I : history, topography, and environment / David Whitehouse with contributions by Donald S. Whitcomb and T.J. Wilkinson.

p. cm.

"British Institute of Persian Studies."

Includes bibliographical references.

ISBN 978-1-84217-394-7

1. Siraf (Extinct city)--History. 2. Excavations (Archaeology)--Iran--Siraf (Extinct city) 3. Iran--Antiquities. I. Whitcomb, Donald S. II. Wilkinson, T. J. (Tony J.) III. British Institute of Persian Studies. IV. Title.

DS325.S583W45 2009

935--dc22

2009043942

Printed in Great Britain by
Short Run Press, Exeter

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Editors' Preface

This volume describes the geographical, topographical and environmental setting of the medieval Islamic city of Siraf, which was the focus of extensive archeological explorations under the auspices of the British Institute of Persian Studies in the late nineteen-sixties and early nineteen-seventies. Drawing on the evidence of the architectural remains and the cultural material recovered from the site and its surrounding area, it outlines how this trading city and its agricultural hinterland functioned in its heyday and in the subsequent period of its decline. The importance of Siraf is emphasised by the fact that the Iranian Center for Archaeological Research recommenced excavations at the site in 2007.

This volume is the prolegomenon to the fascicules on *The Congregational Mosque* and *The Coins and Monumental Inscriptions* at Siraf that have previously been published, and it draws on preliminary reports published in the journal *IRAN* in the late 1960s and early 1970s. The text was largely written during the decade that followed the Iranian Revolution, and it is with great pleasure that we are now able to finally bring it to publication as the first volume of the British

Institute of Persian Studies' new archaeological reports series. Those familiar with the previous fascicules on Siraf will note that this volume is being published in a different format and that the previous numbering is no longer being continued.

The materials for the volume were finalised and assembled by the authors in early 2008. The printed text was edited for publication by Edmund Bosworth, and Cameron Petrie reformatted the manuscript, edited the plates, maps and drawings, and finalised the text ready for publication. The editors would like to thank Carla Lancelotti for her help with the illustrations and David Redhouse for georeferencing the maps.

The resulting work will, it is hoped by the authors and editors, contribute to our knowledge of the history, the demography and the economic and commercial life of the northern Persian Gulf shores of the province of Fars during high medieval Islamic times, all the more so since this is a period for which the extant written historical and literary sources are sparse and fragmentary.

C. Edmund Bosworth and Cameron A. Petrie
September 2009

Contents of the Accompanying CD-ROM

The disk contains high-resolution digital copies of plans of Siraf produced as a result of surveys carried out between 1967 and 1971.

The folder "Gis Format" contains a georeferenced .TIFF file that can be opened using standard GIS software, including ArcGIS.

The folder "Graphics Format" contains .PNG files of each of the six individual maps and the key map that shows their relative arrangement. In addition it

contains a .PNG file that has all of the individual maps joined together into one image. The individual maps will open in all standard graphics software (e.g. Corel Photopaint, Adobe Photoshop). The large .PNG map may not open in certain graphic software due to its size, but it will open in Adobe Photoshop.

For notes and updates, see:

<http://www.arch.cam.ac.uk/siraf/>

Folders

Gis Format

Siraf_Maps_site_grid.tiff

Siraf_Maps_site_grid.tfw

Graphics Format

Key_to_Siraf_Maps.png

Siraf_Map_1.png

Siraf_Map_2.png

Siraf_Map_3.png

Siraf_Map_4.png

Siraf_Map_5.png

Siraf_Map_6.png

Siraf_Maps_joined.png

Chapter 1

Introduction

Between 1966 and 1973, the British Institute of Persian Studies conducted seven seasons of excavation and survey at Siraf, which between A.D. 800 and 1050 played a leading role in the network of maritime trade that supplied Western Asia with the products of India, the Far East and Eastern Africa. This volume contains a summary of the written evidence of the history of Siraf and of what we know about the character of the city, the ways in which its inhabitants exploited the hinterland and its role in the maritime trade of the Indian Ocean.

The site of Siraf stands on the Iranian coast of the Persian Gulf, 220 km south-east of Bushehr and 380 km west-north-west of Bandar 'Abbas (Fig. 1). The site's existence, in a bay now occupied by the village of Taheri, has been known to European travellers since the early nineteenth century (Fig. 2). James Morier, the author of *Hajji Baba of Isfahan*, sailed past the site in 1808 and described it, presumably from hearsay, in *A Journey through Persia* (Morier 1812: 51). In 1829, Capt. G. B. Brucks, the first marine surveyor of the Persian Gulf, visited the site and concluded that it was Portuguese (Stiffe 1895: 166). Six years later, Siraf was identified. While carrying dispatches to Bushehr, Capt. G. B. Kempthorne, I. N., was caught in a storm and took shelter in Taheri Bay. Taking advantage of his involuntary visit, Kempthorne explored the ruins and recognised that they were the remains of Siraf. Nevertheless, he was not impressed. Taheri, he wrote, was a miserable town and Siraf a "mass of shapeless heaps of rubbish" (Kempthorne 1856–57: 125–26).

It required the practised eye of Sir Aurel Stein to make sense of these "heaps of rubbish." Stein spent a week at Siraf in 1933, in the course of a journey by

mule along the coasts of Fars and Makran. Encamped below the fort of the local shaykh (a title still used on this part of the Iranian coast in the 1970s), Stein and his party mapped, photographed and described the site. He recorded that the walls of stone buildings protruded through the rubble over a distance of more than two km, immediately west of the modern village. Among the ruined buildings, he recognised the congregational mosque (our Site B). He also photographed a second mosque (Site G), the city's spectacular cemeteries and clusters of rock-cut tombs, obviously not Islamic, which caused him to speculate about the origins of Siraf. Given the brevity of his visit,

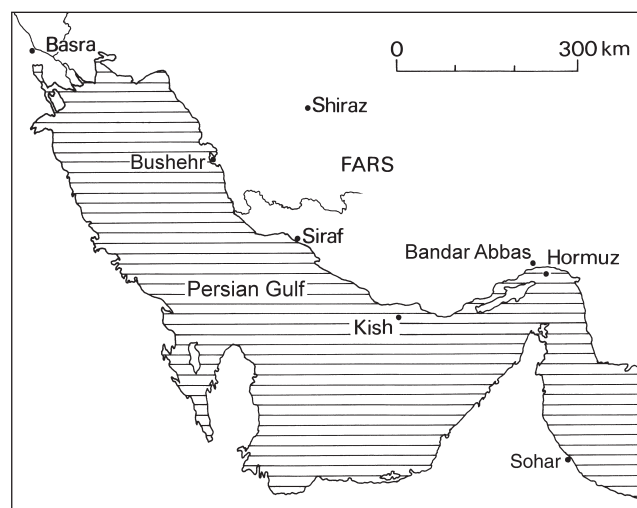


Figure 1. The location of Siraf.



Figure 2. Taheri seen from the east.

Stein's description and in particular his plan of the site (Fig. 3) are astonishing (Stein 1937: 202–12).

The investigation of Siraf was among the first archaeological priorities of the then recently founded British Institute of Persian Studies. In the first volume of *Iran*, Basil Gray, then a member of the Council of the Institute, remarked that "If more is to be discovered about the range and dates of Chinese trade with Persia ... a hopeful line to follow would be an investigation of the sites of the Persian Gulf" (Gray 1963: 18). In the second volume, the director, Mr (later Professor) David Stronach, reported that Dr Alastair Lamb had recently made "an initial survey of the early Islamic port of Siraf on the Persian Gulf. The survey, which it is hoped will be the forerunner of proper excavations in 1965, proved that the site is rich in Chinese and other ceramic imports and that its future exploration would be of the utmost value in any study of early Islamic sea-trade with the Far East" (Stronach 1964: viii; cf. Lamb 1964).

In the event, excavations began in 1966, championed by the President of the Institute, Professor (later Sir) Max Mallowan and members of the council, notably Sir Mortimer Wheeler and Mr Gray who, together with Dame Kathleen Kenyon, constituted the Siraf Excavation Committee. Their support was crucial, for it encouraged sponsorship on a scale which was, at the time, princely and which enabled us to excavate on a generous scale.

The Institute is indebted to many Iranian friends and colleagues. The former Minister of Information and Culture of Iran, Mr Mehrdad Pahlbod, and the former Director of the Archaeological Service, Mr A. Pourmand, granted us permission to work at Siraf. During the final season, we received all possible assistance from the Director of the newly-established National Research Centre for Archaeology, Dr Firuz Bagherzadeh, and from his colleague in the Department for the Conservation of Historical Monuments, Mr S. M. Khorramabadi.



Major funding for the project was provided by the British Academy, the British Institute of Persian Studies, the British Museum, the Calouste Gulbenkian Foundation and an anonymous trust. Further support came from the Ashmolean Museum, The Corning Museum of Glass, the Monro Trust, the Pilkington Glass Museum, the Royal Ontario Museum, the Royal Scottish Museum and the Russell Trust. In addition to their financial support, the British Museum, the Ashmolean Museum, the Royal Ontario Museum and the Royal Scottish Museum assisted us by releasing members of staff to work in the field. We acknowledge the support of all of these institutions with gratitude.

We are also indebted to other individuals and institutions in the United Kingdom and Iran. In the United Kingdom, the following generously lent equipment: the Department of Civil Engineering, Imperial College of Science, London; the Winchester Excavations Committee; Hilger and Watts Ltd; and the Galton Foundation. The Pitt-Rivers Museum, Oxford made room for some of our finds in its storage facility. For advice on particular aspects of the site and the finds, I am personally grateful to John Ayers, the late Sir Archibald Creswell, Margaret Medley, Helen Mitchell, Mary Tregear, the late Samuel Stern and many others. They were unstinting in their support for the project and they made countless allowances for my ignorance of the cultural history of the Islamic world and China.

In Iran, the staff of the excavation received help and hospitality from managers and staff in the Bushehr-based offices of DOPCO (a subsidiary of Shell Iran NV), Entreprise de Travaux Pétroliers Maritimes, Decca Services and Philco Ford, and of Price International Inc. in Abadan. I cannot adequately describe the impact of their cheerful company, plumbing and mid-Atlantic cuisine on the excavators' morale!

My warmest thanks are also due to the entire staff of the British Institute of Persian Studies but in particular to the former director, David Stronach, and successive assistant directors, the late Antony Hutt, David Blow and A. H. Morton, for unfailing encouragement and advice on every aspect of living and working in Iran, from bureaucracy to the bazaar. One of my most vivid memories of Siraf was a visit by David Stronach, who with enormous aplomb shepherded a distinguished trio across the flooded Rud-i Mand to stay with the bedraggled excavators: Sir Mortimer, Sir Max and Dame Agatha, who endured the tribulations of winter on the Persian Gulf as though they were everyday occurrences.

The staff of the excavation is beyond praise. Every season, the team worked efficiently and cheerfully, despite spartan conditions both on and off the site. The

members of staff were as follows (the dates indicate the seasons in which they participated, each season being identified by the year in which it began; 1967, for example, refers to the second season, which began in 1967 and ended in 1968): Frances Ainger (1967), Hugh Ainsley (1967), Fred Aldsworth (1968), Jennifer Aldsworth (1968), James Allan (1966), Warwick Ball (1970, 1972 and 1973), Nicholas Bradford (1969), Leslie Brown (1969), Alan Carter (1967), Patricia Cathcart (1970), Diane Clegg (1968), Joseph Cloutman (1970), Gerald Dalby (1968), Peter Donaldson (1968–70 and 1972), Oliver Drerup (1967), Jeanine Erskine (1970), Jonathan Erskine (1969 and 1970), Pauline Farnsworth (1969), Peter Farries (1970–72), Géza Fehérvári (1970), Elliot Fine (1970), Eileen Flynn (1970), Laura Glashan (1969), Robert Hamilton (1970), Edward Harris (1968), Lars Hesselgren (1968), John Hoar (1972), Stephen Hughes (1973), Shirley Jarman (1972), David Jeffrey (1972), Sarah Jennings (1967, 1969–70, 1972–73), Mary Karshner (1972), Nicola Kisch (1970), Susan Leppard (1973), Clifford Long (1968), the late Nicholas Lowick (1968–70, 1972), Barbara Manley (1973), John Manley (1973), John Morrish (1972), Rosemonde Nairac (1968), Enid Parson (1968), the late Ralph Pinder-Wilson (1966), Emma Playfair (1973), Barbara Pough (1966), Pamela Pratt (1966), Graham Price (1970), Jan Roberts (1967–70), Lucy Robertson (1966), Imogen Robinson (1970, 1972), Sydney Robinson (1970, 1972), Celia Room (1969), Geoffrey Sansbury (1966), Jennifer Scarce (1968), Ron Shoesmith (1968), Giles Sholl (1967 and 1968), Jennifer Sibson (1967), Krystyna Spirydowicz (1972), Stephen Spowart (1973), Sonya Stangroom (1968), Barbara Stephen (1969), Miranda Till (1969), Mark Tweg (1969), Janet Walker (1969), Donald Whitcomb (1972), Ruth Whitehouse (1966–70 and 1972), Tony Wilkinson (1969 and 1972), David Williams (1972) and the late Andrew Williamson (1967 and 1968).

Visitors to the site also gave us valuable assistance and advice. They included: Marguerite Bryant (1973), Robert H. Brill (1967), Peter Farries (1967), John Hansman (1966), Renata Holod-Tretiak (1970), Sean McMahon (1967), Paul N. Perrot (1967), Swatantra Pidara (1973), Susanne Russell (1967), Laurence Smith (1967), Oliver Watson (1972), Donald Whitcomb (1972) and Andrew Williamson (1969 and 1970).

During the excavation and survey, we were joined by seven representatives of the Iranian Archaeological Service or the National Research Centre for Archaeology, to whom I extend our sincere thanks for facilitating local arrangements and enduring our simple lodgings: Enayat Amirlu (1970), Husain Bakhtiari (1972 and 1973), Mahmoud Khordvani (1966), Gholam-Reza Massoomi (1970), Muhammad Mavadat (1973), Taghi Rahbar (1967–69) and Jahangir Yasi (1973).

For six of the seven seasons, we had the help of a loyal cook, Fayaz Mamashi, who worked wonders with slender (indeed, often scrawny) resources.

Above all, we were fortunate to live in a village that tolerated eccentric foreigners and was a source of excellent labour. After the first two seasons, when we employed “pickmen” from Persepolis (the most venerable of whom treasured a recommendation from Herzfeld!), the villagers of Taheri provided the best of our workmen.

The Excavation

At the outset, my brief was deceptively simple: to learn as much as possible about Siraf and its place in the network of maritime trade described in the literature of the day. As the project matured and we began to understand the potential of the site, more specific objectives took shape and, in addition to recovering the physical remains and material culture of early Islamic Siraf, we investigated the entire development of the site from the Sasanian period to the present day; the urban topography of Siraf at the time of its greatest prosperity; land-use within an irregular radius of five to seven km of the city walls; the routes between Siraf and the hinterland; the exploitation of cultivable land in the valleys of Jam and Galehdar; and the archaeological evidence for overseas trade.

At Siraf, the excavation of each area or “site”, was conducted as a self-contained operation, with its own supervisor or supervisors, who were responsible for the day-to-day direction and recording of the work (the locations of the sites are shown in Fig. 11 on p. 20). Archaeologists who read the following paragraphs, may be alarmed by the size of the labour force. The large numbers, however, simply reflect the fact that all spoil was removed from the site by hand, usually in baskets. My normal practice was to divide the workmen into teams of ten, in each of which one workman excavated with a pick, a small pick or a trowel, one shovelled the spoil into baskets and eight carried the baskets to the dump. In a labour force of 200, therefore, only 20 selected workmen actually broke the ground. By the end of the second season, our local pickmen were skilled excavators, who understood stratigraphy and achieved a good recovery rate of all objects, including fragments of bone.

The first season of excavation lasted seven weeks, between October and December 1966 (Whitehouse 1968). Apart from exploring the site, our main accomplishment was to cut a trench near the centre of Siraf in order to ascertain the depth of artificial deposits and to recover a stratified sequence of pottery. The

trench (Site A) was 15 m long and 5 m wide. It revealed seven metres of archaeological deposits, all of which appeared to be Islamic. While we were excavating at Site A, the unexpected threat of road works at the nearby site of the congregational mosque compelled us to undertake a rescue excavation to recover as much information as possible about its plan and structural sequence, before the building was destroyed. The excavation (Site B) revealed that the mosque was 55 m long and 44 m wide, with a courtyard surrounded on three sides by double arcades and with a prayer hall five bays deep. After the congregational mosque had fallen into ruin, a smaller mosque was built in the remains of the prayer hall. Subsequently, thanks to the intervention of Mr Khordvani, the representative of the Iranian Archaeological Service, the road was diverted and work at Site B continued at a more measured pace in all subsequent seasons. We carried out two other small excavations in 1966: at Site C, where soundings revealed a large building, thought at the time to be a house, and at Site D, where we identified and began to explore the potters’ quarter. Finally, members of the team took part in a brief expedition to Jam, a fertile valley in the hinterland, which supplied Siraf with fruit and vegetables. Our subsequent survey of Jam and the neighbouring valley of Galehdar is described on pp. 77–97.

The second season, from October 1967 to January 1968, was more ambitious (Whitehouse 1969). We worked for twelve weeks and employed up to 160 workmen. At Site B, we completed the excavation of the small, post-medieval mosque, then recorded and demolished it. We excavated the congregational mosque down to the latest floors and exposed the tops of the walls of a lateral extension. At the beginning of the season we began to excavate a short distance west of Site A, where the remains of buildings protruded through a low mound (Site E). The buildings, like the small mosque at Site B, proved to date from the fifteenth and sixteenth centuries, a period in which the city of Siraf no longer existed and a modest settlement, known as Shilau, occupied the site (see p. 15). Despite torrential rain, we completed this investigation in late November. Rather than continue digging at Site E, which would have required the demolition of the buildings just uncovered, we moved 180 m farther west, where excavation revealed the presence of several well-preserved buildings of the ninth to eleventh centuries A.D. (Site F). Thus by the end of the second season, we were investigating two distinct episodes in the occupation of Taheri Bay: (1) an urban phase, which flourished between the ninth and the eleventh centuries A.D., i.e. Siraf; and (2) a non-urban phase, attributed to the fifteenth and sixteenth centuries, Shilau.



Figure 4. Site B. The entrance of the Inner Enclosure.

The third season, from October 1968 to February 1969, was the longest yet; it lasted fourteen weeks, during which we employed up to 200 workmen (Whitehouse 1970). Throughout this period we continued to excavate the congregational mosque, acquiring new information on the structural history of the main enclosure and the extension and on a newly discovered external ablution area. Concealed beneath the mosque were the remains of a large building, which was already ruined when the main enclosure was begun, at the beginning of the ninth century. Meanwhile, further excavation at Site F revealed four additional houses, all of which had been abandoned, we believed, before 1150. We also investigated the ruined mosque (Site G), which had attracted the attention of Stein and other visitors. While excavation proceeded at Sites B, F and G, the surveyors mapped every trace of stone buildings in the area west of Taheri (see p. 114). Their efforts changed the nature of the excavation. Intuition about where to dig next no

longer counted; with the surveyors' maps in hand, we could pick our targets and systematically investigate different components of the medieval city: mosques (revealed by their distinctive plans and orientation), residential quarters, palaces and bazaars.

The fourth season, which began in October 1969 and ended in February 1970, again lasted fourteen weeks and involved 200 workmen (Whitehouse 1971a). Throughout the season, excavation continued at Site B, where we concentrated our efforts on the structures beneath the congregational mosque. The large building was identified as a fort, now known as the Inner Enclosure (Fig. 4). This was associated with an Outer Enclosure (Fig. 5) containing a warren of small structures separated by alleys. At Site F, we excavated beneath the floors of the houses exposed in 1967–69, in three cases recovering the plans of earlier structures. Guided by the survey maps, we returned to Site C, where excavation confirmed that the "house" examined in 1966 was part of a bazaar,



Figure 5. Site B. Part of the Outer Enclosure with the entrance of the Inner Enclosure in the background.

which contained shops, a small public bath and a mosque. Finally, at Site D, we uncovered a large part of the potters' quarter, complete with workshops and the remains of thirty kilns.

The fifth season, between November 1970 and February 1971, once more lasted fourteen weeks, and employed a labour force of 150 (Whitehouse 1972a). In the first half of the season, we continued to work at Site B, with the intention of learning more about the early enclosures. We established that the Inner Enclosure, if symmetrical, was a square building, 62 m across, with towers of pear-shaped plan at the corners. The outer enclosure was shown to have a long history, which began in the Sasanian period and continued

until the eighth century. Meanwhile, we examined a ruined mausoleum (Site H), and two structures on the promontory, which forms the west side of Taheri Bay (Site J): a large building of uncertain function and a *hammām*. In the second half of the season, we transferred the labour force from the congregational mosque to a palatial complex discovered during the survey (Site K), in which the largest building measured at least 37 × 38 m and had more than thirty rooms on the ground floor. At the same time, the workmen from Site J carried out minor tasks at Sites C, D, E, F and G. Thus by the end of the fifth season, we had added a third episode – pre-Islamic and perhaps non-urban – to the history of settlement in Taheri Bay.

The sixth season, from November 1972 to March 1973, again lasted fourteen weeks (Whitehouse 1974). We employed 150 workmen and excavated at seven sites. The season was full of surprises, especially in three hitherto unexplored areas: Sites M, O and P. Excavations at Sites M and P, on the edge of a rubble-free depression near the shore, which we suspected at first of being the silted basin of an artificial harbour, revealed a cemetery, a group of houses, two mosques and an intermittent curtain wall erected at the top of the beach, evidently in haste, in the tenth century. Meanwhile, at Site O, we discovered a cemetery of monumental tombs of Islamic date intended for collective burial. At Site B, we concluded our investigation by addressing four questions: was the area occupied before the construction of the early enclosures; was the Inner Enclosure really square and when was it built; and what, if anything, had occupied a presently rubble-free area north of the congregational mosque? Three small soundings in the Inner Enclosure revealed evidence of earlier occupation. The associated pottery, which included red polished ware from Gujerat or Sind, suggested a date within the first few centuries A.D. The Inner Enclosure was shown to be almost square, with a ditch on the landward side. In the rubble-free area, we found another part of the early Islamic bazaar. Elsewhere, further work at Site K included the investigation of large parts of two buildings and small parts of four other structures, all of which appeared to belong to a single walled compound more than 150 m long and 75 m wide. This was the largest group of buildings discovered at Siraf and the property, we assume, must have belonged to one of the city's wealthiest families. We also completed our work at Site J and investigated a small, aisled building of unknown function at Site N. As the excavations proceeded, we conducted a survey of the geomorphology, soils and evidence for past irrigation and land-use in the immediate hinterland (see pp. 54–76).

In 1973, we returned briefly to complete our work at Site O and to protect the walls of the congregational mosque by capping them with plaster. At the same time, we explored the routes between Siraf and the valleys of Jam and Galehdar (the results of the survey are described on pp. 77–97).

Two years later, Husain Bakhtiari, who had worked with us as the representative of the Iranian Center for Archaeological Research in 1972, led an Iranian expedition to Siraf, the results of which were noted in *Iran* (Bakhtiari 1976).

The Finds

We attempted to collect all artifacts and botanical and faunal remains encountered in the excavation, and frequent examinations of the spoil heaps suggested that the rate of recovery was more than satisfactory. Additionally, in 1972, we collected samples of very small objects, fauna and plant remains, using a flotation device built on the site from materials available locally (Williams 1974).

The finds were registered and “processed” at the excavation’s house in Taheri. Small finds were catalogued and, if necessary, they received first-aid conservation. All the pottery was classified and counted, before featureless fragments were discarded. Significant finds were drawn and photographed. At the end of the season, all small objects, restored pottery, fragments of glass and fauna, and a generous sample of potsherds, were removed to the Iran Bastan Museum, Tehran, for division between the excavators and the museum. Large stone objects, such as inscribed grave covers (e.g. Fig. 43), and additional samples of pottery were stored at the house, which in 1973 was consigned (with its contents) to the Iranian authorities.

At the time of the excavation, the finds made by foreign archaeological expeditions were divided between the expeditions and the Iran Bastan Museum. The museum had the right to pre-empt “unique” objects, after which it was customary to divide the material into two equal parts and draw lots to determine which part remained at the museum and which went to the expedition. Items other than artifacts (e.g. animal bones and soil samples) were sometimes included in the division and sometimes were retained en masse by the expedition.

As a result of the division, The British Institute of Persian Studies received approximately one-third of the small finds from Siraf, together with large quantities of pottery and virtually all the fauna and flotation samples. Selections of small finds and pottery were donated to the following institutions, all of which supported the project: the Ashmolean Museum, Oxford; the British Museum, London; the Corning Museum of Glass, Corning, New York; the Calouste Gulbenkian Foundation, Lisbon; the Pilkington Glass Museum, St Helens; the Royal Ontario Museum, Toronto; the Royal Scottish Museum, Edinburgh.

Chapter 2

The Written Evidence

This short survey of the written evidence about Siraf, drawn mainly from secondary sources (notably Le Strange 1905; Wilson 1928; Stein 1937; Aubin 1959 and 1969; and Tampoe 1989), is divided into six sections, which cover the period from Sasanian times to the present:

1. Pre-Islamic Siraf
2. The seventh and eighth centuries
3. 'Abbasid and Buyid Siraf
4. The decline of Siraf
5. Shilau
6. Taheri

1. Pre-Islamic Siraf

The written sources are almost unanimous in their silence about Siraf before the ninth century A.D. (Fiorani Piacentini 1992). Almost the only exception was Tha'alibi, who repeated a legend that attributed the origin of Siraf to the mythical Iranian king Kai Kavus. The existence of the legend implies that, in the ninth century, Siraf was already thought to be an ancient city but that its origins were unknown.

The first tangible evidence of possibly pre-Islamic occupation was recorded by Stein (1937), who speculated about the date of rock-cut chambers, which he identified as Zoroastrian *ostodāns*. Stein's conjecture about the existence of a pre-Islamic community was confirmed during the excavations of 1966–73. Sasanian Siraf emerged from the excavations as a substantial but elusive site: substantial because, apart from the citadel and the buildings beneath the congregational mosque, we found Sasanian material in six widely dispersed areas (Sites D, F, K, L, M and O); elusive,

because we learned very little about its topography and development (Whitehouse 1971b; 1972a: 87; 1975: 266; Whitehouse and Williamson 1973: 33–35). The citadel occupied one of the highest and least accessible parts of the ridge, with commanding views of the bay and all approaches. The most frequent surface finds were fragments of "Massive" ware – not the "Massive Jars" of Chittick (1984: 84) but a distinctive variety of coarse pottery, loosely datable to the first few centuries A.D. The structures beneath the mosque consist of the Inner Enclosure, a fort of modest dimensions (Fig. 6), and the Outer Enclosure (Fig. 7) which contained numerous small buildings (Whitehouse 1970: 8; 1971: 4–5; 1972a: 68–71; 1974: 5–7). The Outer Enclosure had a long history, which began at an undetermined date in the Sasanian period and ended in the eighth century. Evidently, it developed outside the fort and so the fort, too, is Sasanian. Despite the occurrence of Sasanian objects (mostly coins: Lowick 1985: 12–15, nos. 5–37) in six other parts of Siraf, no further structures were shown conclusively to be Sasanian, although we suspected pre-Islamic origins for the western city wall, one of the buildings at Site K and many of the rock-cut ossuaries, which are presumably Zoroastrian. We should note, however, that Zoroastrians still lived at Siraf in the tenth century; Buzurg b. Shahriyar mentions a Zoroastrian captain, Abu 'l-Zahr al-Barkhati, who was among the city's most notable inhabitants (Buzurg b. Shahriyar 1981: 13).

Nevertheless, pre-Islamic Siraf occupied a unique strategic position: it was the coastal terminus of the most convenient caravan route from the Persian Gulf to the principal Sasanian cities of Fars, Gur (the capital of the first Sasanian ruler, Ardashir) and Istakhr. A fortified settlement protecting a natural harbour at

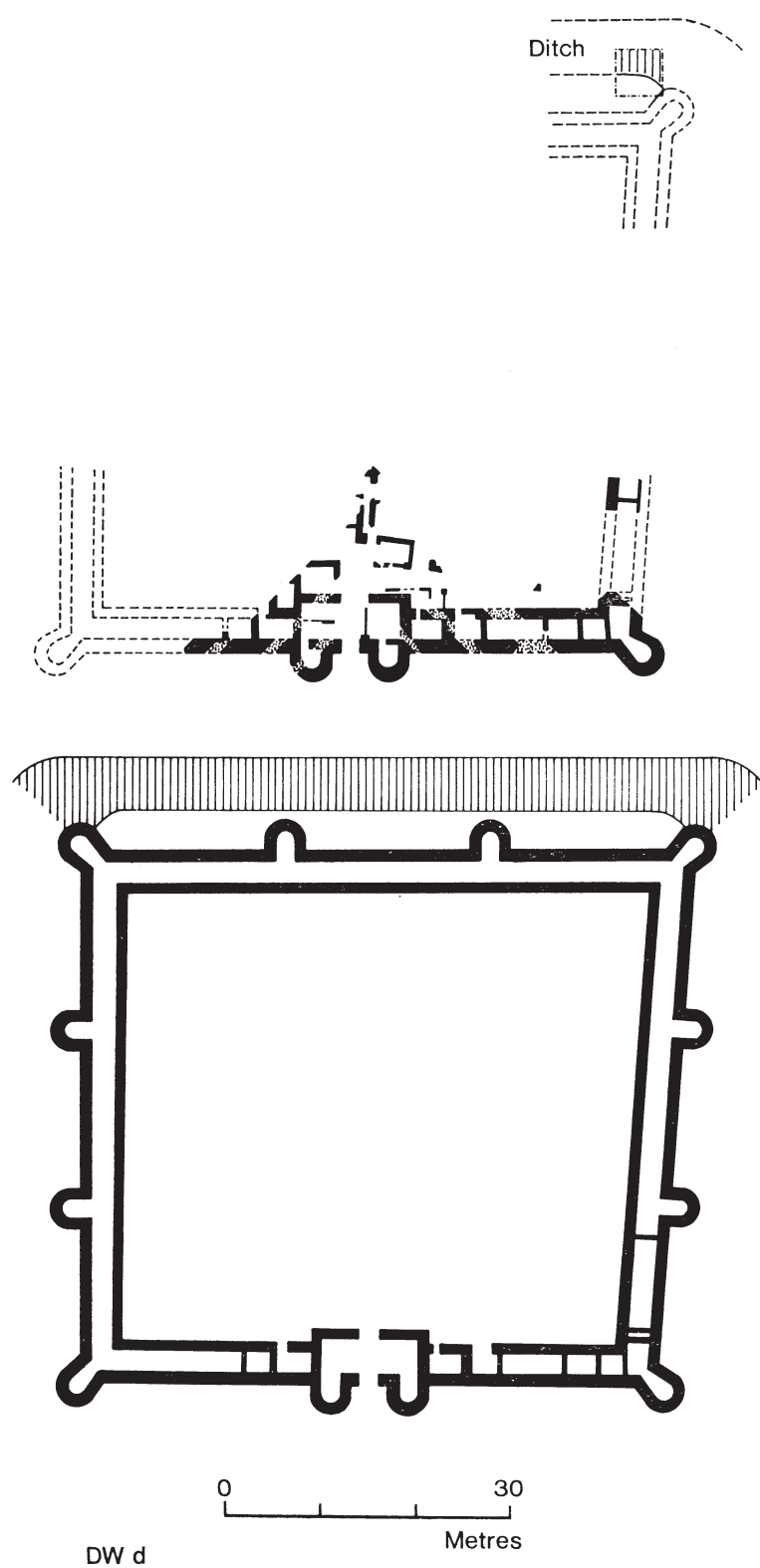


Figure 6. The Sasanian fort at Site B, showing excavated structures (above) and the conjectured plan (below).

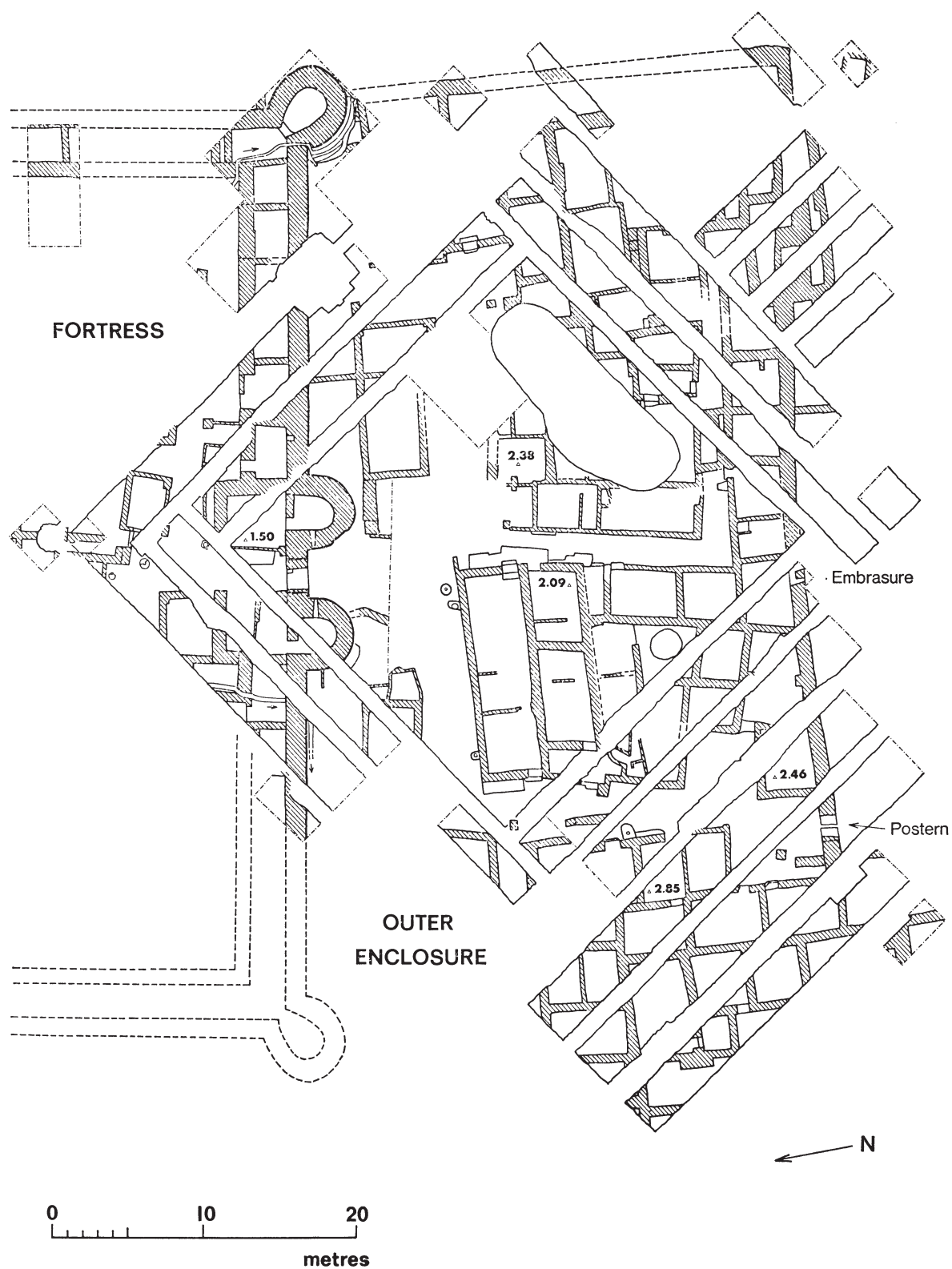


Figure 7. The Sasanian fort and the Outer Enclosure.

the beginning of a caravan route to the capital cannot have failed to play a significant role in the Sasanians' strategy for defending Fars. This strategy was based on the assumption that control of Fars was dependent on control of the Persian Gulf, and that control of the Persian Gulf required a presence on the Arabian coast. In addition, Sasanian policy was at times expansive in the pursuit of security and trade.

A naval base at Siraf would have served the Sasanians well in most periods, but we are aware of two moments when it would have had particular value. The first moment came in the reign of Ardashir I (224–41). Having received the respects of the kings of the Kushans, Turan and Makran, Ardashir advanced from Gur and attacked Bahrain, whose ruler, Sanatruk, committed suicide rather than submit to the invader. The second moment occurred when Shahpur II Dhu'l-Aktaf (309–79) prepared an expedition into the Arabian peninsula by mustering his forces at Gur. In both cases, Siraf (rather than Rishahr to the north or some unidentified port to the south) would have been the obvious place for embarkation (Whitehouse 1971b).

We have reason to suppose that Siraf also played a part in the defence of Sasanian Fars against the Arabs in the seventh century (Fiorani Piacentini 1992). The Sasanian defender of Bahrain (8 to 14–15 A.H./A.D. 629–35) received reinforcements and supplies by sea and, while these could have come from several parts of the Persian Gulf coast, the most convenient point of departure would have been Siraf. Shortly after the Arab conquest of Bahrain, in 16/637 or 17/638, the commander was informed that the Sasanians were mustering forces at Siraf and elsewhere on the coast of Fars and he received authority to mount a counter-offensive (Hinds 1984: 42). Moreover, writing of the suppression of an uprising at Istakhr and of the Arab conquest of Gur in 29/649–50, Al-Baladhuri reported that, as part of the offensive, the Arabs besieged Shahriyaj for more than a month. Al-Baladhuri then added that some of the people of Fars had told him that Shahriyaj was an old name for Siraf. His report makes excellent sense in so far as, if the Arabs had advanced from Istakhr to the north and Siraf to the west, Gur would have been caught in a pincer movement. Although it has been suggested that Shahriyaj should be equated with Shahr-i Ij, the stronghold of the Shabankara in the twelfth century (see below p. 14), the identification with Siraf is very attractive. In any case, the archaeological evidence makes clear that a Sasanian fortified settlement existed at Siraf, and its close connection with Gur implies that it was – from time to time – of considerable strategic importance.

2. The Seventh and Eighth Centuries A.D.

Ricks (1970: 343) described the seventh and eighth centuries as a period of transition and realignment in the Persian Gulf. At Siraf, despite the scepticism of Fiorani Piacentini, the excavations revealed that the Sasanian fort had fallen into ruin and its gatehouse had undergone erosion before the construction of the congregational mosque about A.D. 800. They also showed that, at least in the vicinity of the fort, occupation in the period between its abandonment and the building of the mosque was modest. This is consistent with the almost total ignorance of pre-Islamic Siraf demonstrated by early Islamic writers; if occupation had continued on a significant scale, one would expect something more substantial than a story about the city's foundation by the legendary Kai Kavus.

Although modest, the seventh- to eighth-century settlement was not entirely insignificant. The earth used to fill the platform, on which the congregational mosque was constructed about A.D. 800, contained a group of silver coins minted between 80 and 121/699–70 and 738–39 (Lowick 1985: 16–20, nos. 42, 44–49, 51–55, 58, 59, 61, 62 and 64–72), which appear to be the remains of a hoard concealed in the early eighth century and disturbed some sixty years later.

The same fill revealed that, by the late eighth century, Far Eastern ceramics were reaching Siraf, together with a Chinese bronze mirror and at least one Chinese coin, and their presence suggests that the settlement was now a port of more than local significance. We have no reason to suppose that, at this date, Sirafi merchants had established direct contact with China; but they were certainly beginning to participate in a network of trade that extended to China (see p. 101).

3. Abbasid and Buyid Siraf

Despite its undoubted prosperity between the ninth and the eleventh centuries, Siraf is mentioned in relatively few contemporary documents. Nevertheless, these documents provide a clear picture of the international role of Sirafi merchants. Thus, Ibn Khurradadhbih, writing in 844–48, noted that Jewish merchants from Siraf were trading with both the Mediterranean world and India (Ibn Khurradadhbih 1967: v. 4, 41), while the author of the *Akhbar al-Sin wa 'l-Hind*, which was written about 850 and survives in the writings of Abu Zaid of Siraf (d. 303/915–16), recorded that Siraf was the starting point for voyages to China (Abu Zaid 1922). The importance of the China trade was underlined by other ninth and tenth century authors,

such as Ibn al-Faqih and Sulaiman the Merchant (1922; see also Le Strange 1905: 258–59). Abu Zaid, however, noted that the trade with China had been undermined by the expulsion of foreigners from Guangzhou in 876, although even after this date Chinese coins were still used at Siraf (Lowick 1985: 6–7, n. 30).

Sirafi merchants traded in other regions, too. Apart from India and points farther east, tenth-century documents refer to their activities in the Red Sea and on the African coast. Al-Istakhri (1967: 127) observed that much of Jidda's trade was with Iran and that Iranians constituted the city's elite. Al-Mas'udi (1962: 94) encountered Sirafi ships at Qanbalu on the African coast between 916 and 926, and he noted that the demand for exotic goods in Shiraz caused Sirafi captains to increase the frequency of sailings to Sofala in Mozambique. Hamza al-Isfahani reported that a merchant from Siraf, Hasan b. 'Amr al-Sirafi, ventured as far afield as Kanem in the Central African region of Chad (Marvazi 1942: 54).

The most extensive account of Siraf was written in the later fourth/tenth century by the Arab geographer Ibn Hauqal (1965: v. 2, 284–88; see also Bosworth 1997). The city, he reported, was almost as large as Shiraz, the capital of Fars, which had blossomed under its Buyid rulers. It flourished, despite the difficult climate and the shortage of water. The wealthiest merchants were millionaires, who might spend 30,000 dinars on a house. (The dinar was a gold coin weighing about 4.25 gr; 30,000 dinars contained about 127.5 kg of gold.) He described one such merchant, Ahmad b. 'Umar al-Sirafi, whom he met in Basra: "This man, prouder than a prince, possessed a considerable fortune; a manager handled his business affairs; he had contacts with partners and agents far away; his warehouses were overflowing with spices, precious stones and perfumes; his vessels sailed to India and China, as well as the African coast." The merchandise available at Siraf included aloes, ambergris, camphor, gemstones, ivory, ebony, spices and pearls. There is also mention of the importation of teakwood (*sāj*) from East Africa, a probable reference to mangrove poles, which were used extensively in the Persian Gulf for building (see p. 110). Ibn al-Balkhi (writing about 504/1110), who apparently had access to official records, noted that in the reign of the 'Abbasid Caliph al-Muqtadir (295–320/908–32), the duty levied on goods entering Siraf contributed 253,000 dinars to the annual revenue of Fars (Ibn al-Balkhi 1962: 136–37). This figure, if accurate, indicates that the total value of goods imported to Siraf annually was 2,530,000 dinars, or about 10,752.5 kg of gold.

Two events overshadowed commercial activities in the Persian Gulf in the tenth century: the rise of the

Carmathians and their Omani allies, and the counter-offensive of the Buyids (Wilkinson 1964; Williamson 1973). Both had an impact on the fortunes of Siraf.

In the confused conditions of the late ninth century, as the power of the Baghdad caliphate declined, the Carmathians established themselves in al-Hasa or Bahrain, the western shores of the Persian Gulf. Their first major attack on the caliphate came in 311/923, when in seventeen days of butchery they plundered Basra, which by now had begun to recover from the Zanj revolt of 257/871 (see p. 107) and without doubt was the largest city near the head of the Persian Gulf. In 317/930, the Carmathians sacked Mecca, carrying off the Black Stone of the Ka'ba, which they kept in al-Hasa for twenty years. Later in the same year, they conquered Oman and the leading Omani family, the Wajihids, became their vassals. Oman had long occupied an important place in the maritime trade of the Persian Gulf; now, it enjoyed a boom. Omani merchants frequented ports in India, Indonesia, East Africa and the Red Sea. Ibn Hauqal described Sohar, the capital and principal port of Oman, as a splendid city: "It is not possible to find on the shore of the Persian Sea nor in all the land of Islam a city more rich in fine buildings and foreign wares than Sohar." The anonymous author of the Persian geography, the *Hudūd al-'ālam*, described Oman as "the emporium of the world" and added, "There is no town in the world where merchants are wealthier" (*Hudūd al-'ālam* 1937: 148).

The Omanis increased their activities in the Persian Gulf. Indeed, events may suggest a determined effort to gain control, at a time when the 'Abbasid caliphate was virtually helpless. Thus, in 331/943, an Omani fleet once more attacked Basra. The Omanis captured the port of Ubulla but failed against Basra, where their fleet was destroyed by local fire ships. Ten years later, in 341/952–53, an Omani fleet attacked Basra yet again, this time with the support of Carmathian troops. However, the new Buyid ruler in southern Iraq, Mu'izz al-Daula, held them at bay.

Further evidence for Omani ambitions in the Persian Gulf is provided by the history of Huzu, a town on the mainland of Fars, which served as the point of embarkation for Kish. From at least the time of the Prophet, Huzu had been ruled by an Omani family, the Banu Julunda, who extracted passage money from coastal shipping. For a short time in the period of Omani expansion (338–49/949–60), dirhams were struck at Huzu in the name of the Julundid chieftain, Ridwan b. Ja'far, in clear defiance of the Buyid government in Fars (Williamson 1973: 25–27). By the mid-tenth century, it seems, the Omanis and their nominal overlords the Carmathians had removed from the Buyid amir much of his control in the Persian Gulf.

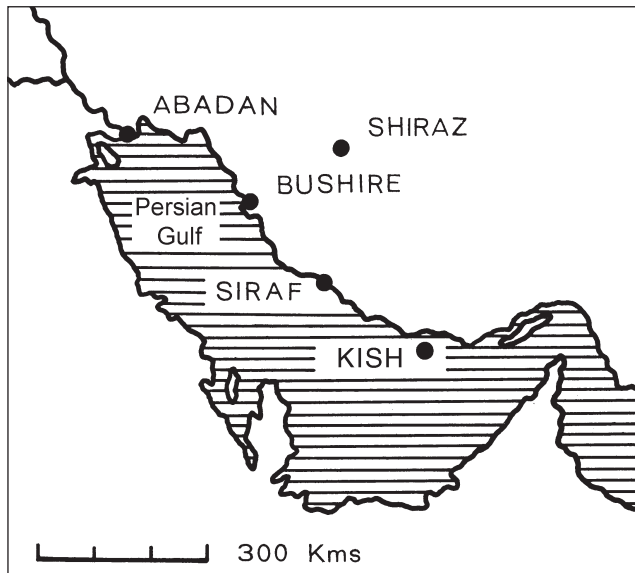


Figure 8. Siraf and Kish.

At first, the Buyids attempted to resolve the problem of Oman by diplomacy and in 354/965, Mu'izz al-Daula sent an embassy to Sohar. The attempt failed. In the same year, therefore, Mu'izz al-Daula dispatched a fleet from Basra under the command of Abu 'l Faraj Muhammad b. 'Abbas. The fleet collected reinforcements at Siraf, where Mu'izz al-Daula's nephew 'Adud al-Daula had assembled troops from Fars. The expedition was successful and Abu 'l Faraj caused widespread destruction in Oman. Following this victory, the Buyids established a garrison in Oman. In 360/971, however, the garrison rebelled and 'Adud al-Daula was compelled to organise a second expeditionary force. Commanded by Abu Harb, the Buyid forces seized and devastated Sohar, killing many of the inhabitants and destroying seventy-nine ships (Williamson 1974: 93–96). Subsequently, Oman remained under Buyid control for three generations, despite another, unsuccessful, rebellion in 433/1041–42.

Thus, in the period A.D. 965–73, Oman was eclipsed as an independent power and the Buyids established firm control of the Persian Gulf, an important development in view of the attention the rival power of the Fatimids gave to eastern trade after their conquest of Egypt in 358/969 (Lewis 1949). The creation of the port of Aidhab on the Red Sea coast of Egypt as the terminus for trade with the east and the acquisition of Yemen, with its long experience of trade with India and beyond, gave the Fatimids a firm foothold for activity in the Arabian Sea. But by holding both Fars and Oman, the Buyids effectively controlled access to

the Persian Gulf, thereby deterring any encroachment that the Fatimids may have contemplated.

4. The Decline of Siraf

Writers of the period from the tenth to the twelfth centuries A.D. advanced two reasons for the decline of Siraf (Aubin 1959). Al-Maqdisi (1906: 96), writing in the late fourth/tenth century, believed that an earthquake in 366/977 caused extensive damage and persuaded many of the merchants to transfer their business to Sohar, which was now in Buyid hands. A century and a half later, Ibn al-Balkhi believed that the rise of a rival port, Kish (Fig. 8), caused huge losses of revenue at Siraf.

In reality, the situation was more complex than such writers supposed. Siraf did not collapse overnight. Nowhere in the excavation did we find unequivocal evidence of extensive earthquake damage and there is reason to suppose that the event of 366/977 was less than catastrophic. The conjecture that "the collapse of many of the large houses at Site F, the large house at Site A, and the mansion-complex at Site K can be firmly dated to 977" (Tampoe 1989: 79) has absolutely no archaeological foundation. Moreover, the city's mint continued to function for another fifteen years and all but one of the dated grave covers from the site were carved after A.D. 977 (Lowick 1985: 81–82). Finally, the failure of Siraf was due not simply to its replacement by Kish, but was part of a general decline in commercial activity in the Persian Gulf (Whitehouse 1975, 1983).

The Buyid state collapsed in the mid-fifth/eleventh century under the impact of the Saljuq invasions. In southern Fars, a Kurdish tribal group, the Shabankara, took advantage of the situation to establish a powerful confederacy based on their fortress at Ij (Aubin 1959: 297; Bosworth 1997). Despite the efforts of successive Saljuq governors in Shiraz, the Shabankara dominated the countryside for eighty years, cutting roads and threatening towns. Shiraz itself, reduced to a shadow of its former size and prosperity, was captured at the end of the twelfth century. Under these circumstances, we may assume, merchants were unwilling to risk their goods in the mainland ports of Siraf and Najirām, or on the caravan route to Shiraz. In southern Iraq, too, the situation deteriorated. Basra had suffered repeatedly at the hands of the Zanj, the Omanis and the Carmathians; now famine and revolt inflicted further damage. In 441/1052, Nasir-i Khusrau reported that half the city was in ruins.

The decline of Siraf and the rise of Kish took place against a background of instability and recession.

Nevertheless, although conditions compelled merchants to leave Siraf, and in some cases to abandon the Persian Gulf, urban life continued, albeit on a diminishing scale. The congregational mosque at Siraf was restored in the twelfth century, the bazaar remained in use and elaborate grave covers were carved until at least [5]58/1185–86 or [6]81/1282–83 (Lowick 1985: 79–86). At the same time, however, we have references to Sirafi families moving to Fal in the hinterland of Fars, Sohar in Oman, and Jidda and Ghulafiq on the Red Sea coast (Aubin 1959: 297; Zarins 1989: 242). Ramisht of Siraf, a very prominent twelfth-century shipowner, used Aden as his home port (Stern 1967). On the African coast, at least one family was found with the *nisba* “Sirafi”. Finally, we read of Sirafi settlers on Kish.

Indeed, Ibn al-Mujawir (d. 690/1291) maintained that the settlement on Kish was founded by merchants from Siraf, although the geographer al-Idrisi (writing in 1153–54) states that the island was captured, fortified and equipped with a fleet by a ruler from “Yemen”. Ibn al-Balkhi is silent about the origin of the rulers of Kish, but he does describe their rise to power. When the ancestors of the present amir gained possession of Kish and the neighbouring islands, he wrote, they diverted the revenues of Siraf. Rukn al-Daula Khumartigin, the Saljuq governor of Fars under the Saljuq Sultan Muhammad (r. 1118–31), travelled to Siraf on either one or two occasions with the intention of assembling a fleet to use against Kish. Each time the amir of Kish bought him off with bribes. Later, however, one of the khans of Kish, Abu ‘l-Qasim, actually occupied Siraf, and held it in the face of repeated attempts by Khumartigin to regain possession. Thus, wrote Ibn al-Balkhi, “no merchant would bring his ship into the port of Siraf to refit, nor would any anchor there for shelter.... Wherefore, no goods but leatherware and pottery, and things that the people of Fars alone needed, now passed by way of Siraf, and thus the town fell into complete ruin”.

Ibn al-Balkhi was writing in c. 503/1110, and clearly by this time Siraf was no longer an international port. One hundred years later, by the time of the geographer Yaqut (writing in 615/1218), it was almost a ghost town, with only a handful of inhabitants, living there for no other reason than that it was their ancestral home. The only major building in good repair was the congregational mosque (Yaqut 1955–57: vol. 3, 295).

Kish, meanwhile, prospered (Aubin 1959: 298–99). Al-Idrisi mentioned its pearl fisheries and Benjamin of Tudela wrote of Kish that “The merchants who come from India and the islands, encamp there with their wares. Moreover, men from Shinar, el-Yemen and Persia bring thither all sorts of silk, purple and flax, cotton, hemp, worked wool, wheat, barley, millet, rye, and all

sorts of food, and lentils of every description, and they trade with one another, whilst the men from India bring great quantities of spices thither. The islanders act as middlemen, and earn their livelihood thereby. There are about 500 Jews there” (Signer 1983: 119).

The fortunes of Kish were founded on its fleet. In al-Idrisi’s day, the ruler was said to possess fifty *mushayyi’āt*, each of which was sixty cubits long and capable of carrying two hundred men. In 529/1135, the navy of Kish blockaded Aden (Goitein 1954). Al-Idrisi reported that the amir also attacked the coasts of the *Zanj* and *Qamaran*, and that Indians feared him.

The power of Kish lasted until 626/1229, when the island was conquered by the ruler of Hormuz, now the most important city in the Persian Gulf region. After 692/1292, Kish enjoyed a brief, but spectacular renaissance as the commercial capital of Jamal al-Din Ibrahim al-Tibi (d. 1306), the Ilkhanid governor of Fars, who became virtual ruler of the Persian Gulf (including Qatif, al-Hasa, Bahrain and Hormuz) and established a near-monopoly of the India trade (Aubin 1959: 90–91; Lowick 1974). About 731/1330, however, Kish was conquered by Tahamtam II of Hormuz and thereafter it declined (Williamson 1973: 59; Fiorani Piacentini 1975: 84–85).

5. Shilau

The key to understanding the history of the post-medieval settlement at Siraf is provided by Yaqut, who recorded that in his day it was known as *Shilau*. The name *Deh-Shilau* is still attached to part of the site, although no trace exists of the village “about four miles to the northwest of Taheri”, that was known in the last century as *Shila* (Stiffe 1895: 172). By recording events at Shilau and Fal, Aubin (1969) was able to sketch the changing fortunes of Siraf between the thirteenth and the sixteenth centuries. Fal is the name of a town, and hence of a region, in the hinterland of Fars. After the decline of Siraf, Fal became the most important town in the area, giving its name not only to a tract of the interior, but also to the coast. Thus the mountain called *Jabal Jamm* (by Al-Istakhri) or *Jabal Siraf* (by Ibn Najib) was known later as *Jabal Fal* (by Ibn Majid), a name which survives today as *Sir Yafal*. In the thirteenth century, the terms Sirafi and Fali were sometimes synonymous. Thus when Rashid al-Din referred to Fal (which is 90 km from the coast) as a port, he probably meant Siraf.

Indeed, we know that Siraf continued to function as a port. The first member of a family from Fal to reach ministerial rank, Majd al-Din Isma‘il I (d. 666/1268) made his fortune from merchandise at Siraf. In the

fourteenth century, Ibn Battuta used the port of “Kish, which is called Siraf.” Discussing the chronology of Ibn Battuta’s journeys, Hrbek (1962: 449) concluded that the place in question was Siraf, not Kish itself, and that the visit took place in May 1347. A century later, a traveller from Qatif to Shiraz landed at Shilau.

During the fourteenth century, Fal became independent of Kish and Hormuz, and in the fifteenth and sixteenth centuries it was a small, but locally important, sovereign state. The *ra’is* of Fal garrisoned the coast and had interests in Bahrain. In 1528, António Tenreiro described *Chilaão* as a *villa grande e muy nombre*, where the *ra’is* maintained men and artillery. Sixty years later, the Italian merchant Gasparo Balbi mentioned a settlement known as *Silaú* (Bosworth 1997: 668). By this time, however, the port had declined and when, about 1602, Shah ‘Abbas mounted an expedition against the Portuguese in Bahrain, his forces embarked at ‘Asaluyeh (40 km south-east of Sīrāf), not Shilau (Aubin 1969: 36–37).

6. Taheri

Some time between the late sixteenth and the early nineteenth centuries, the name Shilau ceased to be applied to the settlement, which henceforth was known as Taheri. Thus Morier (1812: 48), who sailed down the coast in 1808, referred to it as “Tauhrie (or Tahrie).” When, in the spring of 1835, Kempthorne (1856–57: 125–26) visited Taheri, he found it to be a settlement of 600 to 700 inhabitants, with flat-roofed houses of mud and rubble. It was defended on the west side by an “insignificant fortification or rather wall with loop holes for musketry, flanked about every 60 yards or so with round towers.” The villagers lived mainly by fishing. They had few fields, but kept flocks of sheep and goats. The only cash crops were dried fish and tobacco. Taheri was a mixed community – part-Iranian, part-Arab – ruled by an Iranian *khan*, who paid taxes to the governor of Shiraz. The *khan*, in fact, was a member of the Nasuri family, an Iranised branch of the Arab Muntasir tribe from the Najd region of Saudi Arabia, which had reputedly migrated to the Iranian side of the Persian Gulf in the sixteenth century and which lived at Taheri and the nearby town of Kangan until the 1970s or 1980s (Scarce 2002: 182).

In the next twenty years, the population dwindled,

for when Stiffe (1895: 167) visited Taheri in 1857 he found only 200–300 inhabitants. He mentioned a “small square fort” on a hill at the west end of the village (evidently the spur, which separates the village from the western part of the site: see p. 17). Diving for pearls provided the villagers with cash.

By the beginning of the twentieth century, Taheri had revived. Lorimer (1908: 1853–54) described it as a settlement of some 150 houses, with palm gardens and fields of wheat and barley. The villagers, he reported, owned 500 cattle, 100 sheep, 50 donkeys and 10 horses. While we may doubt the extraordinarily large number of cattle (which, like horses, are utterly unsuited to the local environment) and the absence of goats, it appears that livestock was plentiful. The population, mostly Sunnis of the Shafi’i law school, included merchants, sailors, fishermen, pearl divers and cultivators. The village exported tobacco, charcoal (from Galehdar) and dried fish. Lorimer noted six Taheri-based *sambuks*, which sailed to Oman and Basra, and four *amilahs*, which were used locally for fishing. The pearl divers worked off the eastern arm of the bay, at Ras Majnun; perhaps they were responsible for the oyster midden shown on Fig. 9.

By 1905, the fort had been demolished and a new building stood at the east end of the village (*Persian Gulf Pilot* 1905: 24). No trace of the east fort survives. Indeed, the existing fort, built by the Nasuri family between 1913 and 1917, stands on the west side of Taheri, almost certainly on or near the site of the “square fort” of 1857. Its most striking features, both presumably original, are a wind-tower and a balcony decorated with eighteen stucco panels depicting scenes from the *Shah-nama* of Firdausi. The fort was abandoned in the 1980s (Scarce 2002: 182). The *Pilot* also mentions two white mosques, 300 yards apart, in the middle of the village. One of these was the nineteenth-century Sunni mosque, which still exists; the other, presumably Shi’ite, may have stood near the present day Shi’ite mosque and the Husainiyya (Whitehouse 1972b).

At the time of the excavation, Taheri was a mixed settlement of Sunni and Shi’ite Muslims, overlooked by the dilapidated fort of the shaikh and suffering from the growing pains of the transition from an economy dependent on fishing and rain-fed agriculture to an economy supported in part by cash sent home by migrant workers in Kuwait, Bahrain and Qatar.

Chapter 3

The Urban Topography of Siraf

This chapter describes the topography of Siraf at the time of its greatest prosperity, between A.D. 800 and 1000. It should be read in conjunction with the maps on the CD in the slip case at the back of the volume. For an account of the mapping procedure employed at Siraf, see Appendix 1 on p. 114.

The Sasanian settlement and its Islamic successor occupied a shallow bay, sandwiched between the beach and the first escarpment of the southern Zagros Mountains, which at this point is less than one km from the shore (Fig. 9). The bay affords a sheltered anchorage, and one of the few caravan routes between the Persian Gulf and the Iranian plateau, that could be traversed by camels, ran from Siraf to successive regional capitals, at Gur/Firuzabad and Shiraz; the first stage of this route connected the coast with the nearest upland valley, in the vicinity of Jam, which traditionally provides dates, lemons and vegetables in return for fish and imported goods, such as rice and flour.

The bay, which takes its name from the village of Taheri, is defined by low promontories of alluvium washed from the hinterland by winter rains. The western promontory is composed of alluvium deposited by a watercourse known as Kunarak, the eastern promontory of alluvium deposited by the Rudkhane Kuchek.

The bay itself is divided into two unequal parts by a rocky spur extending from the escarpment to the shore. In the 1970s, this was crowned by a ramshackle fort occupied by the local shaikh (see Fig. 2). On the west side of the spur, the coastal strip widens until, on the far side of the Kunarak watercourse, the plain of Bagh-i Shaikh is approximately one km across (see Fig. 11).

In the western part of the bay, the escarpment is broken at two points: by the relatively wide Kunarak gorge, through which the modern road from Bushehr approaches Taheri, and, 1500 m to the east, by the narrow gorge of Tang-i Lir. Evidently, the Kunarak gorge served (as it does today) as the starting point of the route from Siraf to Jam, which is described on pp. 77–82. Between the Kunarak gorge and the shaikh's fort, two additional spurs extend from the escarpment towards the shore (Fig. 10). The larger spur, which in fact is almost parallel to the escarpment, extends westwards from Tang-i Lir for about one kilometre. It is separated from the escarpment by a valley known as Deh-Shilau, a clear reference to the name of Siraf in the seventh/thirteenth century (see p. 15). The second, smaller spur lies between the west side of Shilau valley and Kunarak.

To the east of the spur, the remains of Siraf are obscured by the modern village. Although parts of the village appear to rest on several metres of archaeological deposit and at least one small cemetery existed on the escarpment behind it, we believe that dense occupation of the type found on the west side of the spur did not fill the area to the east. Nevertheless, traces of buildings and a wide scatter of medieval pottery indicate former occupation to the east of Taheri and clearly some form of land-use extended as far as the eastern arm of the bay (and beyond: see Fig. 66 on p. 71). We conjecture that the area was occupied mainly by the barasti (shelters) of migrant workers attracted to Siraf by the prospect of work, and perhaps by gardens.

Thus 'Abbasid and Buyid Siraf extended along the shore for four kilometres, from one arm of Tahiri bay

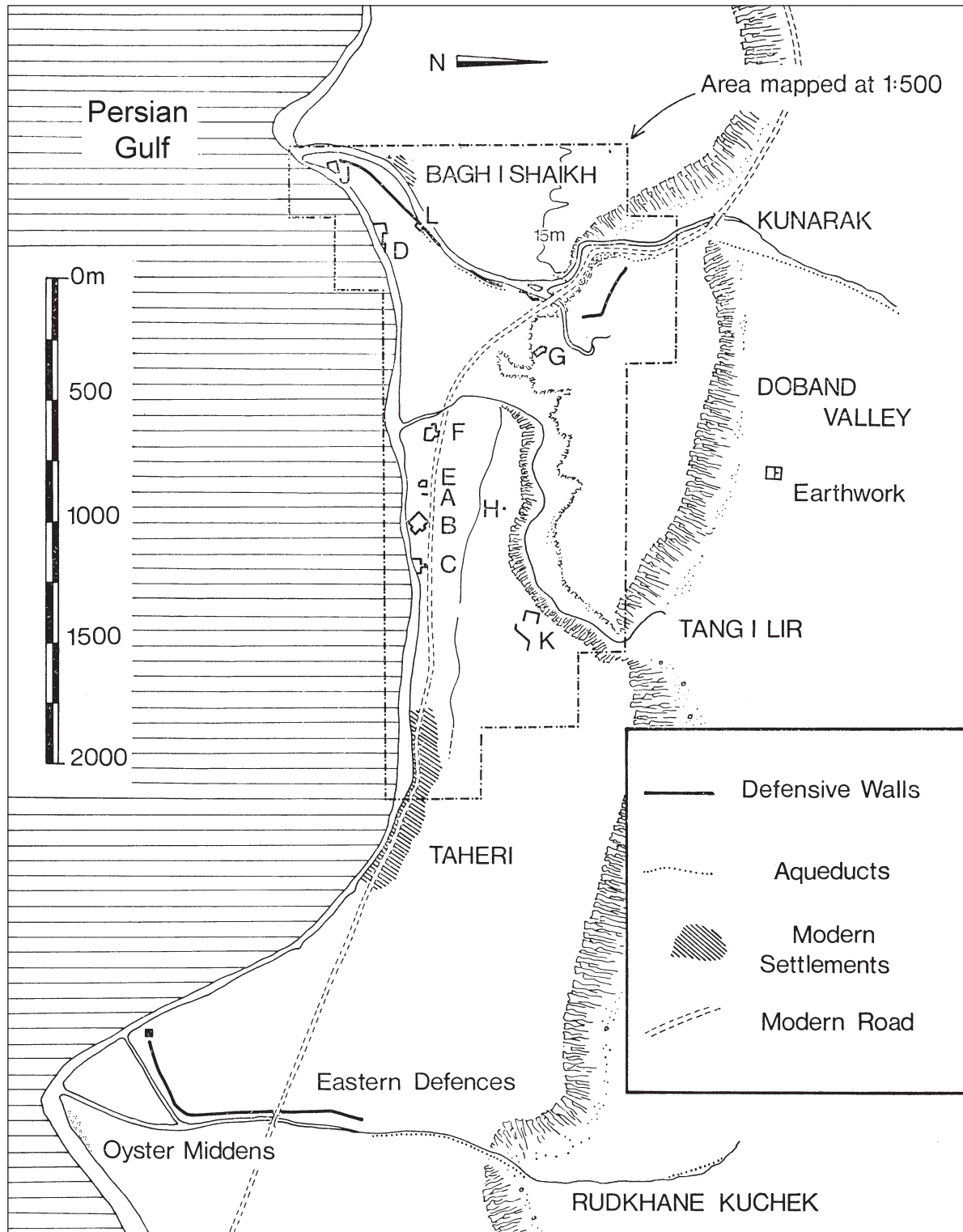


Figure 9. Siraf. (Scale 1:25,000.)



Figure 10. The western part of Siraf, with Kunarak water course at the centre, Site J in the right foreground and Site D on the far right.

to the other. Curtain walls with forts and look-out posts reinforced the banks of the Kunarak and the Rudkhane Kuchek, protecting the approaches along the coastal plain, while the precipitous north face of the escarpment made defences on the landward side unnecessary. As far as we know, the waterfront was unprotected until the tenth century A.D. The total area within the walls was about 250 ha: less than half the area of the Round City of Baghdad, but very large indeed in the context of a region with little rainfall and no perennial river. In the western part of the city, at least 110 ha were densely built-up, with narrow streets and few open spaces (Fig. 11). Near the shore stood the congregational mosque, the bazaar and a residential quarter, with an industrial area near the city wall. On higher ground, well-placed to benefit from any breeze that blew, were the palatial residences of the richest merchants. Behind these, on the flanks of the escarpment, were the cemeteries.

Excavation and survey revealed many of the major components of the western part of Siraf, which are described in the following order:

1. The defences.
2. The water supply.
3. Mosques.
4. The bazaar.
5. Residential quarters.
6. The potters' quarter.
7. Cemeteries.
8. Other features.

1. The Defences

The Islamic city was vulnerable to attack along the coastal plain and from the sea. The approaches by land, therefore, were barred by curtain walls that reinforced the watercourses. In the eastern part of

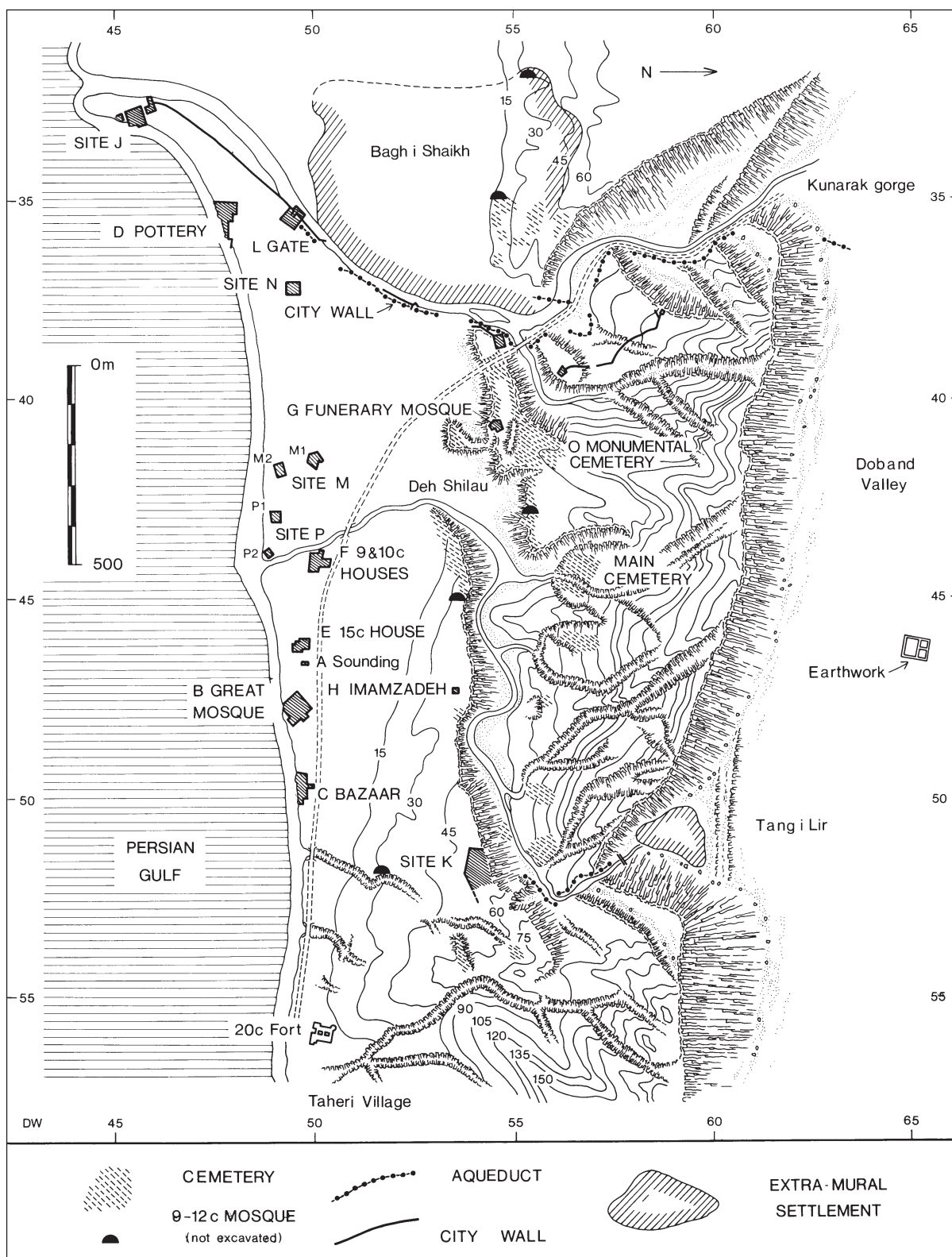


Figure 11. The western part of the city.

the bay, the west bank of the Rudkhane Kuchek was reinforced with a curtain wall, protecting the eastern approaches to Siraf (Whitehouse 1972a: 67). The wall has been destroyed almost totally and it survives intermittently as a single course of boulders bonded with mud, up to one metre wide. At the south end, the curtain wall approaches a small fort, 21 m², with towers at the angles. Three of the towers were square, while the fourth was circular, a combination that recalls the *sur* of Oman (Bakhtiari 1976; cf. Costa 1985). The wall itself was reinforced with at least four semicircular towers with external diameters of 4.0–4.5 m. It had little in common with the buttressed, *sārūj*-bonded (see below) wall on the west side of Siraf and without excavation its date cannot be determined; perhaps it is relatively recent.

The west wall of Siraf was considerably more sturdy. Although only parts of it survive and we know little about the disposition of towers, sufficient remains to show that the wall extended for approximately 1.5 km, from the tip of the promontory to a vantage point high above the gorge, with a clear view of the route to Jam. Indeed, the defences were carefully sited to guard the approaches from both the north and the west. On the coastal plain, the visible remains consist of a footing of boulders bonded with *sārūj* (an iron-hard mixture of clay, lime and ash), roughly one metre wide. At several points, the footing was constructed against, not above, the bank of the watercourse, presumably as a precaution against being undermined by attackers or flash floods. The outer face was reinforced at irregular intervals with slightly stilted semicircular buttresses, 1.6 m across, also made of boulders and *sārūj*. Before the excavation of Site L (Whitehouse 1972: 78–81), only one tower was known: a massive triangular structure, 8 m across, at grid ref. 376524.

In 1970–73 we excavated three buildings on the promontory which forms the west side of Taheri Bay (Fig. 12): a large structure resembling a caravanserai or warehouse at 330455 (Site J, Building A), a *hammām* at 327458 (Building B) and a building of uncertain function at 330452 (Building C) (Whitehouse 1972a: 74–78; 1974: 18–21). All three buildings were protected by the city wall and clearly formed part of an irregular compound, which extended for an unknown distance towards the north. Its association with the wall is evident, and it is possible that Building C was a barracks, Building A an arsenal (rather than a commercial warehouse) and Building B a bath-house for the troops. A group of unusually wide foundations in Building A may have supported a tower. Given that shipping was the *raison d'être* of Siraf, and that lighthouses are known to have existed in the Persian Gulf (Wilson 1928: 59, quoting the fifth/eleventh-century writer Nasir-i Khusrau), it

is not impossible that Building A contained a tower with a light to guide ships into the bay.

Four other structures were associated with the western defences. Excavations at 354496 (Site L) revealed the eroded remains of a gate, at the end of a street extending eastwards for at least 250 m. The gate survives as a break in the wall, 3.9 m wide, approached by a passage 6.7 m long (Fig. 13). We found nothing to indicate the form of the gate; at the inner end of the passage was a pair of rectangular jambs. The whole structure had been repaired or rebuilt on several occasions. The excavation at Site L also exposed the eroded stump of a second triangular tower, 10.4 m wide, immediately south of the gate. At this point, the curtain wall was backed with an earthen bank.

Farther north, on a low hill at the entrance to the Kunarak gorge (386547), the wall appears to be associated with one or more buildings, which may have had a defensive function. Beyond this, as the wall climbed towards the crest of the escarpment, were two smaller buildings, perhaps observation posts.

From the tenth century onwards, the city was also protected by walls from attackers landing on the beach. In the sixth season, during the excavation of Sites M and P, we discovered the footings of a curtain wall, which we traced from 486417 to 433487 (Whitehouse 1974: 18). The wall, which plugged the gaps between buildings at the top of the beach (Fig. 14), was 1.3 m wide and had a foundation 0.75 m deep. The *ad hoc* character of these defences suggested that they were erected hastily against a specific seaborne threat; buildings were requisitioned, sound walls were included in the barrier, but flimsy structures were demolished and replaced by something more substantial. Pottery from deposits sealed by the wall show that it was built in the tenth century, and we conjectured that it belongs to the period between A.D. 943, when the Omanis attacked Basra, and A.D. 972–73, when the Buyids invaded Oman and captured Sohar (Williamson 1973).

The existence of an intermittent curtain wall filling gaps between buildings at the top of the beach may explain the “quay wall”, which Stein described as running for more than 400 m on either side of the congregational mosque (Stein 1937: 208; cf. Lamb 1964: 8). No trace of such a wall exists today, and no local informant could remember the existence of such a wall. Perhaps Stein’s wall, if it existed, resembled the amalgam of structures at Sites M and P. In any case, we assume that Siraf had nothing resembling a quay, either parallel or perpendicular to the shore (as at Rishahr for instance: Whitehouse and Williamson 1973: 40). Then, as now, we suppose, ships anchored off-shore and goods were landed by lighter.

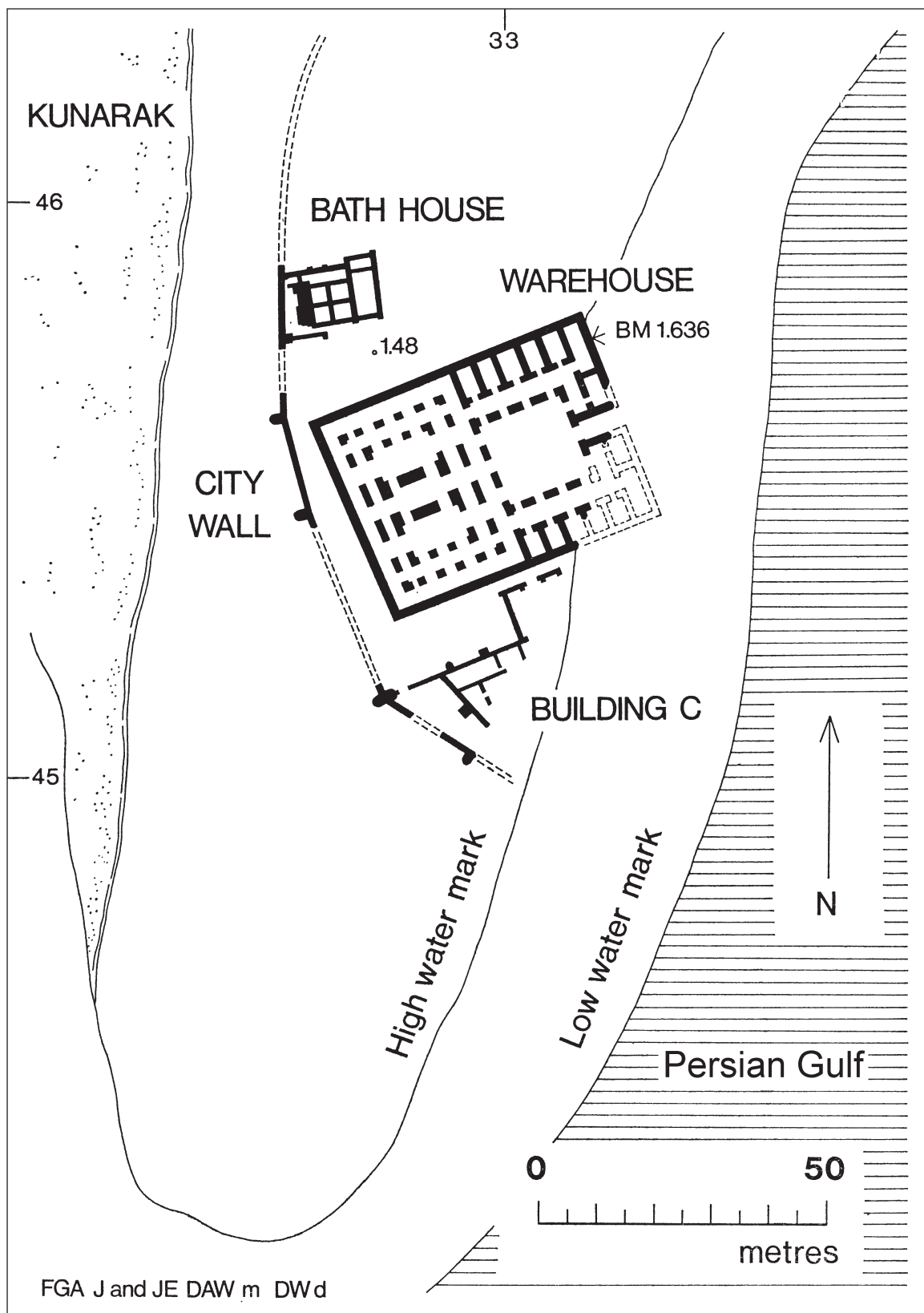


Figure 12. Site J. (Scale 1:1000.)

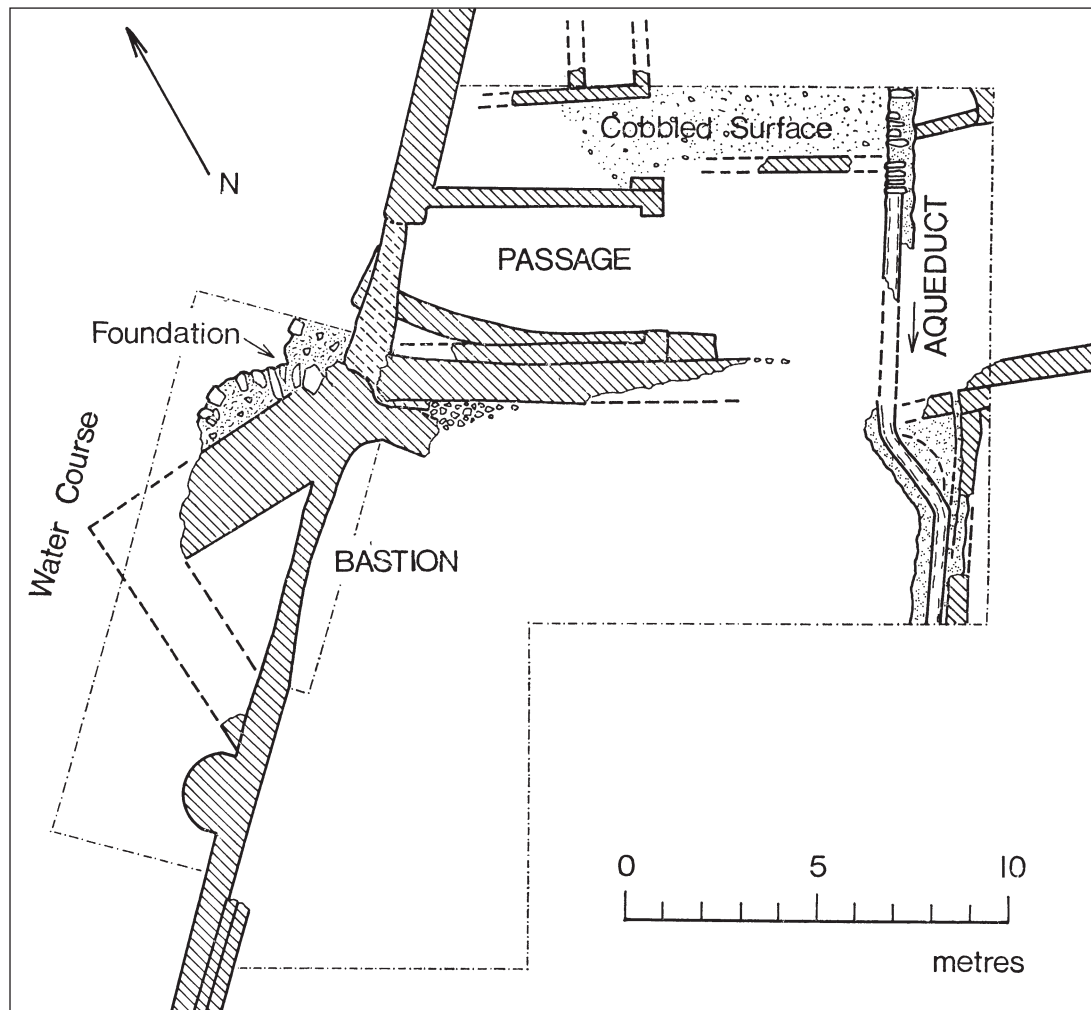


Figure 13. The gate and other structures at Site L. (Scale 1:200.)

2. The Water Supply

Siraf had no permanent supply of running water. The Kunarak and the Rudkhane Kuchek may be filled with water for several hours after a winter storm, but within a day or two they are bone dry. Citizens, therefore, provided for their needs in three ways: by digging wells, such as occur all over the western part of the city, in both private and public spaces; by constructing cisterns to conserve rain water; and by bringing water from the hinterland through conduits (see pp. 62–69).

The cisterns of early Islamic Siraf were rectangular structures with semicircular ends and parabolic or semicircular vaults. The dimensions varied considerably, from 16.6 m long at 359568 to only 3.25 m long at 507527; the width was fairly uniform, usually between 2.4 and 2.6 m, and the depth varied between about 2.0 and 6.5

m. The standard building materials were boulders and *sārūj* for the floor and most of the walls, and mortar-bonded rubble for the upper walls and the vault. The mortar-bonded walls were lined with *sārūj*. The vaulted roofs had at least four rectangular or circular holes, through which water was collected. All well-preserved cisterns have a hole in the vault at one end, presumably for withdrawing water.

We observed forty-nine cisterns in the western part of the city, in the extra-mural suburb at Bagh-i Shaikh and in Kunarak Gorge. Although few large cisterns are likely to have escaped us, the total number of cisterns of all sizes in the walled city and within a few hundred metres of the walls may well have exceeded seventy-five; together, they represent a notable investment of effort and underline that provision of a dependable water supply was literally a matter of life or death.

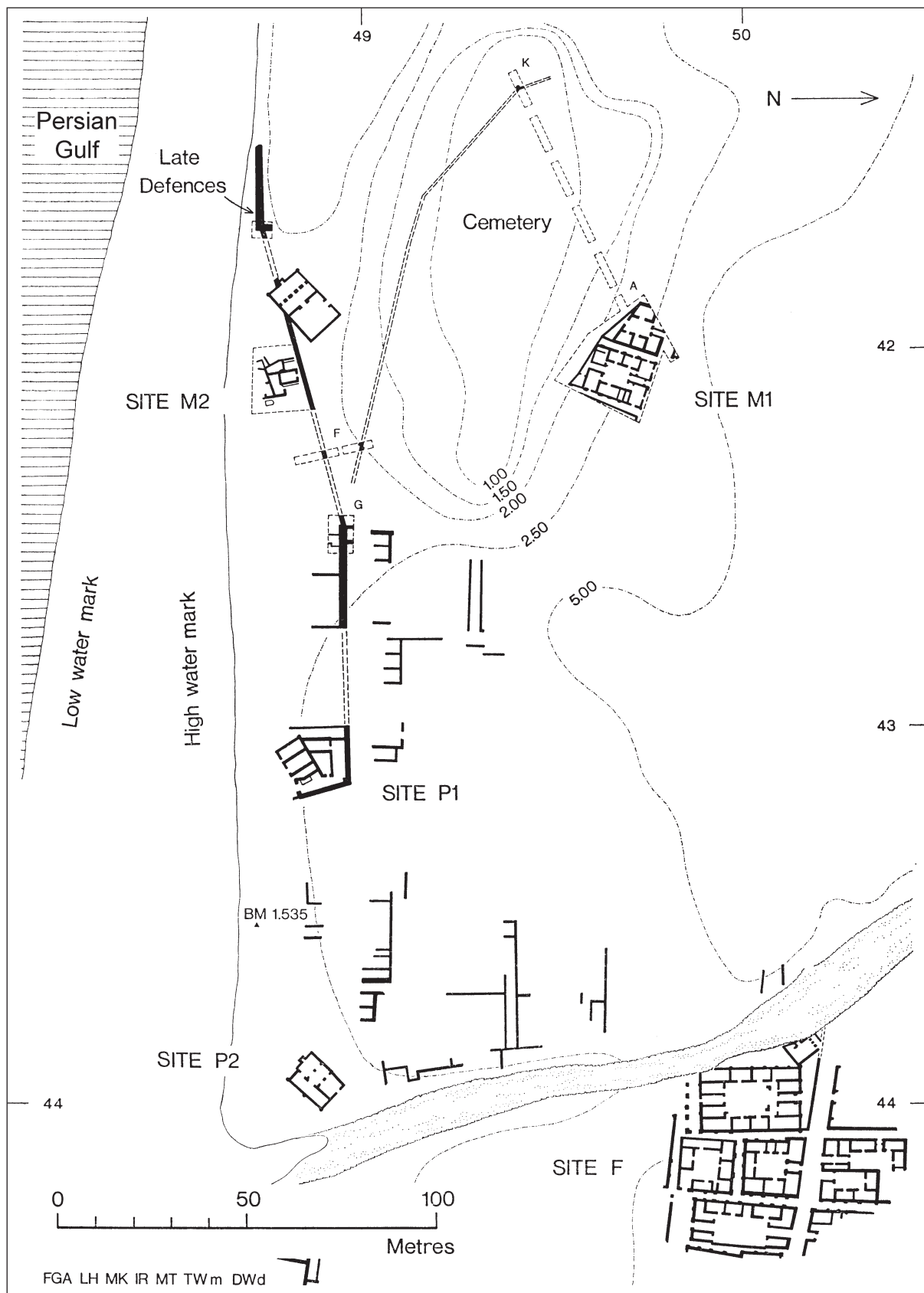


Figure 14. Sites F, M and P. (Scale 1:1500.)

The forty-nine known cisterns had a total capacity of the order of 5 to 5.25 million litres.

The list of cisterns discovered during survey and excavation is as follows:

<i>Grid Reference</i>	<i>Comment</i>
320556	Associated with a mosque.
339500	
344504	
346503	
346506	Associated with a mosque.
348549	
351549	
355478	
363549	In the potters' quarter at Site D (see p. 42–46).
363592	
386547	
406545	
406545	Associated with the mosque at Site G (see p. 36).
413543	
423550	
425564	
425565	Associated with a mosque.
429545	
449537	
457549	
459563	In a cemetery.
459564	
465556	Associated with Site H (see p. 7).
471538	
475525	
475526	
477507	Four cisterns built side by side.
478534	
479534	
478538	
478495	At the congregational mosque (see p. 27).
480495	
484535	Associated with a cemetery.
491534	
492534	
507527	
513524	In the "palace" at Site K (see p. 35).
513542	
518528	
519529	
519552	
531515	
538508	
539555	
543504	
545551	
545553	
545554	
564549	

The distribution of known cisterns may be summarised thus:

1. (25%) are associated with mosques (some of which were built after the heyday of 'Abbasid and Buyid Siraf) or with cemeteries.
2. (4%) are associated with the western defences or with the caravan route through Kunarak gorge.
3. (71%) are associated neither with mosques and cemeteries, nor with the defences and caravan traffic.
4. Of the latter, 16 (46%) are situated above the 30m contour, often in residential areas.
5. And of these 5 (31%) are associated with large compounds, which we identified as the "palaces" of the wealthiest citizens.

In addition to wells and cisterns, Siraf was supplied by conduits, which consisted of tunnels, aqueducts carried on piers and, where necessary, inverted syphons (see pp. 63 and 65). Three conduits entered the city: (1) through Kunarak Gorge, (2) through the ravine known as Tang-i Lir and (3) through the gorge of the Rudkhane Kuchek. The Kunarak conduit hugged the inner side of the curtain wall, extended at least as far south as Site L and may well have been intended to serve the buildings at Site J. The Tang-i Lir conduit (which vanishes at 523553) may have supplied the palace at Site K (p. 34). The conduit in the Rudkhane Kuchek seems to have been associated with the eastern defences and may have had a function analogous to that of the Kunarak conduit.

Conduits, we concluded, were either the exclusive prerogative of the city administration (specifically, those concerned with defence), or the prerogative of the administration and the most privileged citizens. This is hardly surprising; in arid lands, access to water is an index of power and prestige.

3. Mosques

The most important public building in Siraf was the congregational mosque. Although Ibn Hauqal reported that there were three minbars at Siraf, both Ibn al-Balkhi and Yaqut mention only one. The excavation and the survey revealed at least ten small mosques, but only one large congregational mosque (Whitehouse 1980).

The congregational mosque

The congregational mosque (Site B, at 477495) stood near the shore, with the sea immediately beyond the *qibla* wall (Fig. 15). To the north and east, and perhaps

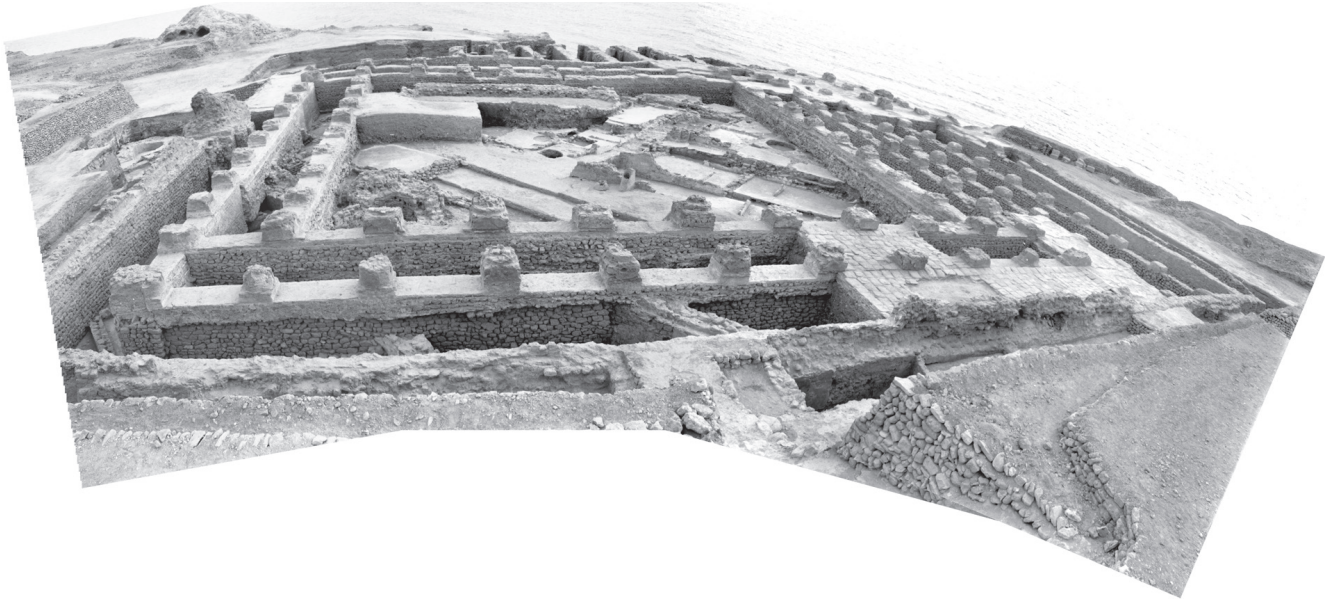


Figure 15. Site B. The foundations of the Congregational Mosque and, beneath them, part of the Outer Enclosure.

also to the west, lay the bazaar. Unless it was tiny, and marine erosion has been far more extensive than we believe, there was no room between the *qibla* wall and the sea for a palace, such as adjoined the principal mosques at Wasit (Safar 1945: 20–23), Marv (Creswell 1989: 3–4) and Baghdad (*ibid.*: 31). In any case, the palaces, we believe, were elsewhere (see p. 34).

In its final form, the congregational mosque consisted of three elements: (1) a rectangular platform 2 m high, which supported the sanctuary, (2) a lateral extension and (3) external ablution facilities (Figs 16 and 17). The excavation revealed at least three, and possibly five, periods of construction. The original mosque, which may have been completed as early as about 200/815, was a rectangular structure 51 m deep and 44 m wide, with the major axis pointing approximately towards Mecca. It consisted of a courtyard surrounded on three sides by a single arcade, with a prayer hall three bays deep (Fig. 18). Not long afterwards, the mosque was rebuilt and enlarged. The platform was extended by one bay at the *qibla* end, increasing the length to 55 m. A new arcade was inserted on all four sides of the courtyard. At the same time, or possibly later, the lateral extension and the external ablution area were built. In the second or third of these building campaigns, the external walls of the mosque were crenellated with cast stucco merlons (Fig. 19). Finally, some time after 542/1147–48, the mosque was restored in either one or two stages. A fragmentary inscription, attributed to the late sixth A.H./late twelfth century A.D., commemorates one such event (Fig. 20).

The smaller mosques

Of the ten smaller mosques, five were found during the excavation and five were recognised in the course of the survey. The excavated mosques, all in the western part of the city, were:

1. Site M2 (419488), on the south side of a walled cemetery (Fig. 21).
2. Site P1 (431489).
3. Site P2 (439489).
4. Site F (438501), in the residential quarter, adjoining House W.
5. Site C (500495), in the bazaar.

The other mosques were either in the western part of the city, or in extra-mural suburb farther west (see Fig. 11 on p. 20):

Urban

6. 429544
7. 449536, adjacent to a small cemetery.
8. 517515

Extra-mural

9. 319555
10. 348548, adjacent to a cemetery.

With one exception (period 1 at Site P2), the smaller mosques formed a homogeneous group, with the following characteristics: they were small, ranging in size from 5.4 × 5.5 m to 9.7 × 10.2 m; they were square or rectangular, usually divided by one or more transverse arcades and with the *mihrāb* contained in a rectangular salient; even in densely built up areas,

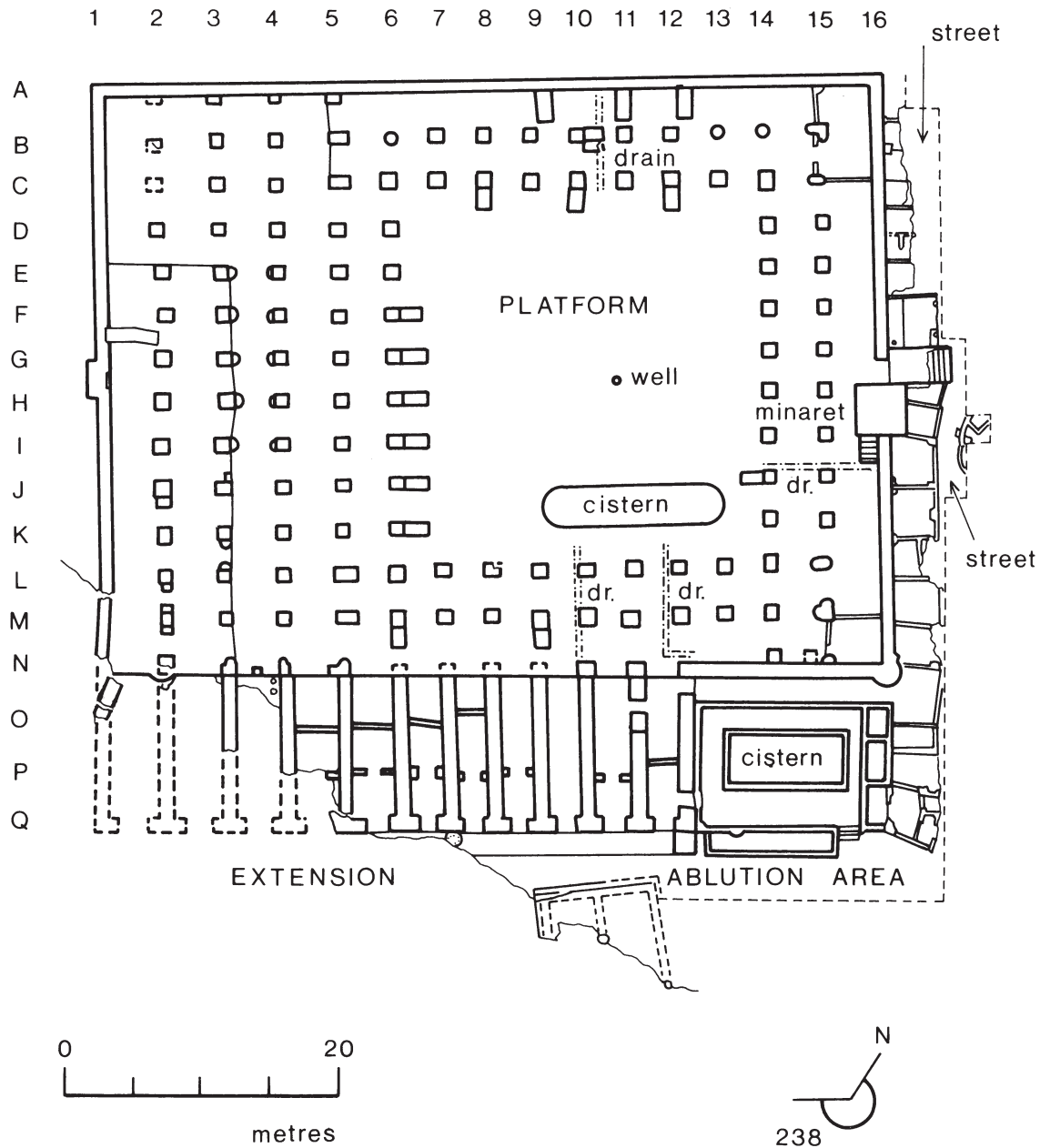


Figure 16. The congregational mosque. (Scale 1:500.)

they were often entered through a modest courtyard; two of the mosques had lateral extensions; and two had features interpreted as staircase minarets. The earliest datable example (at Site C) is attributed to the period 850–900 A.D. None is later than the twelfth century, although the “recent” (perhaps fifteenth-century) mosque at Site B, is of the same general type – as indeed are the existing mosques of Taheri and neighbouring villages (Whitehouse 1968: 11;

1972b). Mosques of this type have broad geographical and chronological distributions. At least five such buildings existed at Samarra in Iraq (Whitehouse 1984), another has been excavated in Bahrain (Kervran 1990; Whitehouse 2003) and numerous examples have been recorded in the Sultanate of Oman (Costa 2001: 35). The mosques at Samarra are in two of the palaces: the Jausaq al-Khaqani, which was built between 221/836 and 227/842, and the Balkuwara, which was



Figure 17. Site B. The ablution area of the Congregational Mosque with part of the extension in the background.



Figure 18. Site B. The courtyard of the Congregational Mosque.

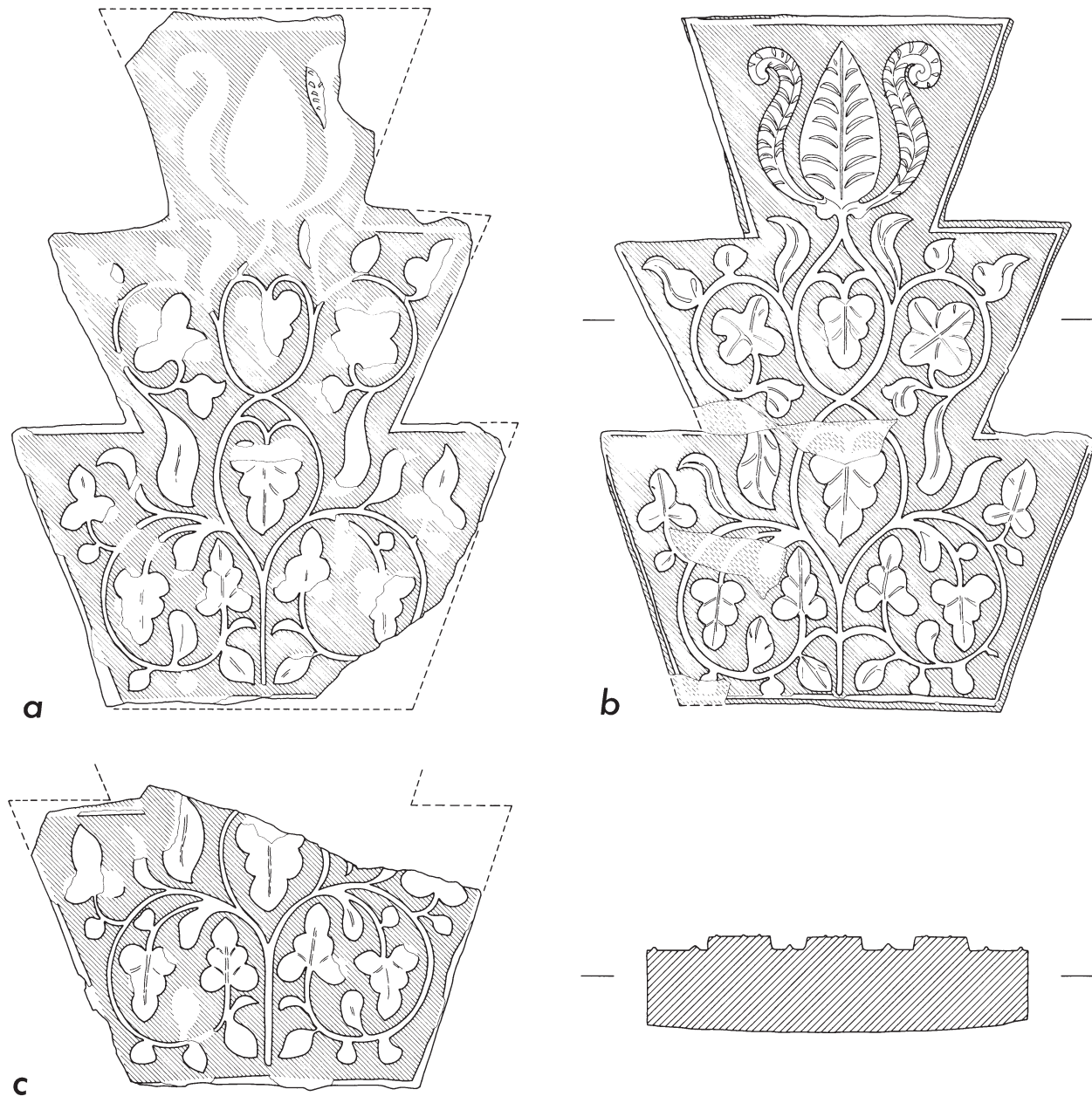


Figure 19. Stucco merlons from the congregational mosque. (Scale 1:4.)

built in 234/849 and 245/859. Several of the mosques in Oman are recent. This distinctive type of building, therefore, has a continuous history that spans almost twelve centuries.

4. The Bazaar

The commercial heart of Siraf was the bazaar, which occupied some five to ten ha between the congregational mosque (or a point somewhat to the west of it and the

modern village. We excavated in two areas of the bazaar: at Site C, where we uncovered more than 1000 m² of buildings, including shops, a mosque and a *hammām*, and at Site B, both immediately outside the Congregational mosque and 50 m farther north (Whitehouse 1968: 11–12; 1970: 8; 1971a: 10–12; 1974: 7–9).

At Site B, we excavated a narrow street, parallel to the façade of the mosque. This ran eastwards past the ablution area, where it met a second street leading to the shore. A third street ran inland from the entrance of

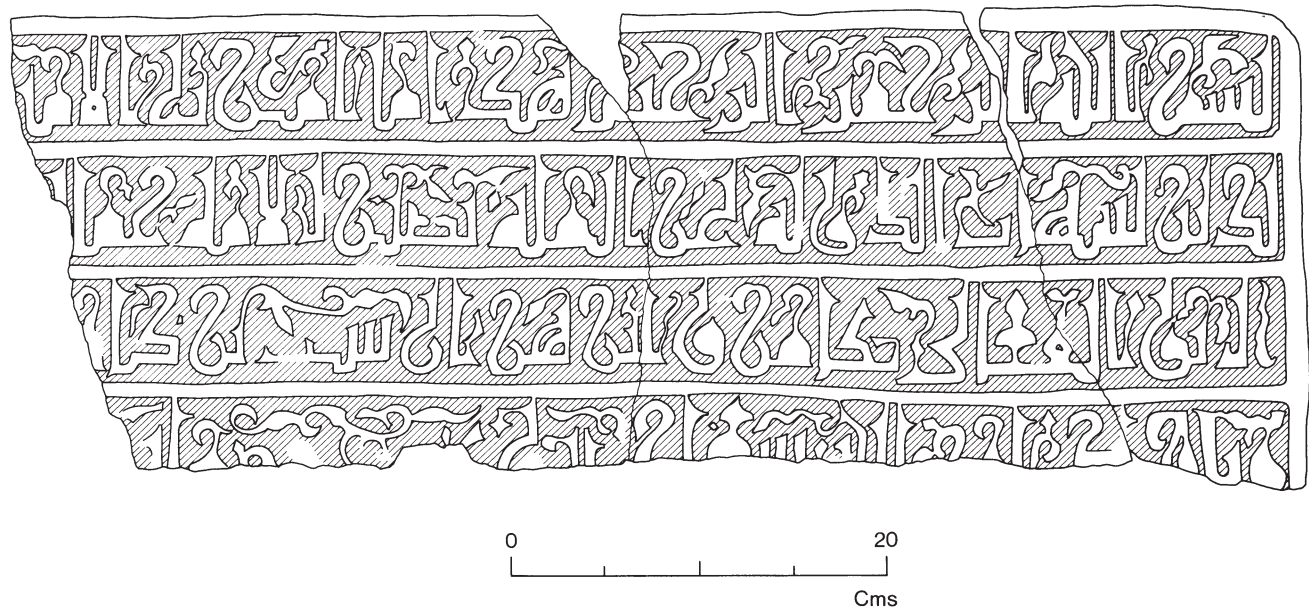


Figure 20. Inscription from the congregational mosque. (Scale 1:4.)

the mosque. The streets were lined with shops (Figs 22 and 23). Abutting the mosque, for example, were some twenty self-contained one-roomed shops, each with an entrance from the street. Internal fixtures included the bases of stands or cupboards. We identified one shop, which contained a large circular oven, as a bakery (Fig. 24); another produced and sold stone vessels, for we found both broken objects and rough-outs; a third shop had a series of small furnaces of unknown function.

In the sounding north of the mosque, we recognised five main periods of construction between the ninth and the eleventh centuries. Throughout their history, the buildings occupied the same places and had much the same plan. Sealed by the floors of every period from 2 to 5, we found copper- or bronze-working debris – droplets of metal, slag and broken crucibles – which suggests that for more than 200 years, this part of the bazaar was occupied by metalworkers.

In both areas, the earliest structures were associated with the same range of pottery and coins as we found in period 1 of the mosque. We concluded, therefore, that the congregational mosque and the bazaar were probably part of a single programme of construction, planned within a decade of A.D. 800 and completed not more than twenty years later.

Our main objective at Site C was to uncover as much as possible of the latest phase, in order to reveal the character of the bazaar (Fig. 25). Traversing the area from west to east was a street, which varied in width

from three to five metres. On the north side of the street, we excavated four buildings: (1) a block of shops; (2) a large building with a courtyard, also containing shops; (3) a *hammām*; (4) an unidentified building, also probably a shop. On the south side of the street were: (5) another block of shops and (6) a mosque.

The first block of shops (1) contained a row of one-roomed premises, comparable with the shops at Site B. Outside the entrances were low platforms of mortared rubble. Today, in traditional Iranian bazaars, such platforms are used for working or displaying merchandise. Building 5, across the street, had at least eight similar one-roomed shops.

The large building (2) had a plan similar to that of the houses at Sites F and M, with a courtyard surrounded by rooms on at least three sides. Its function was not, however, domestic. The front of the building contained four rooms, all accessible from the street, and a central passage leading from the street to the yard. In the final phase (and possibly in other phases, too), the passage did not have a door and we concluded that the public had unrestricted access to the yard. In one of its several phases of construction, the room to the right of the entrance had a plaster bench with two rows of hollows, perhaps intended to contain small objects offered for sale. The building emerges, therefore, as a complex of shops, some of which were entered from the street and others from the yard: an arrangement recalling the *funduq* (which

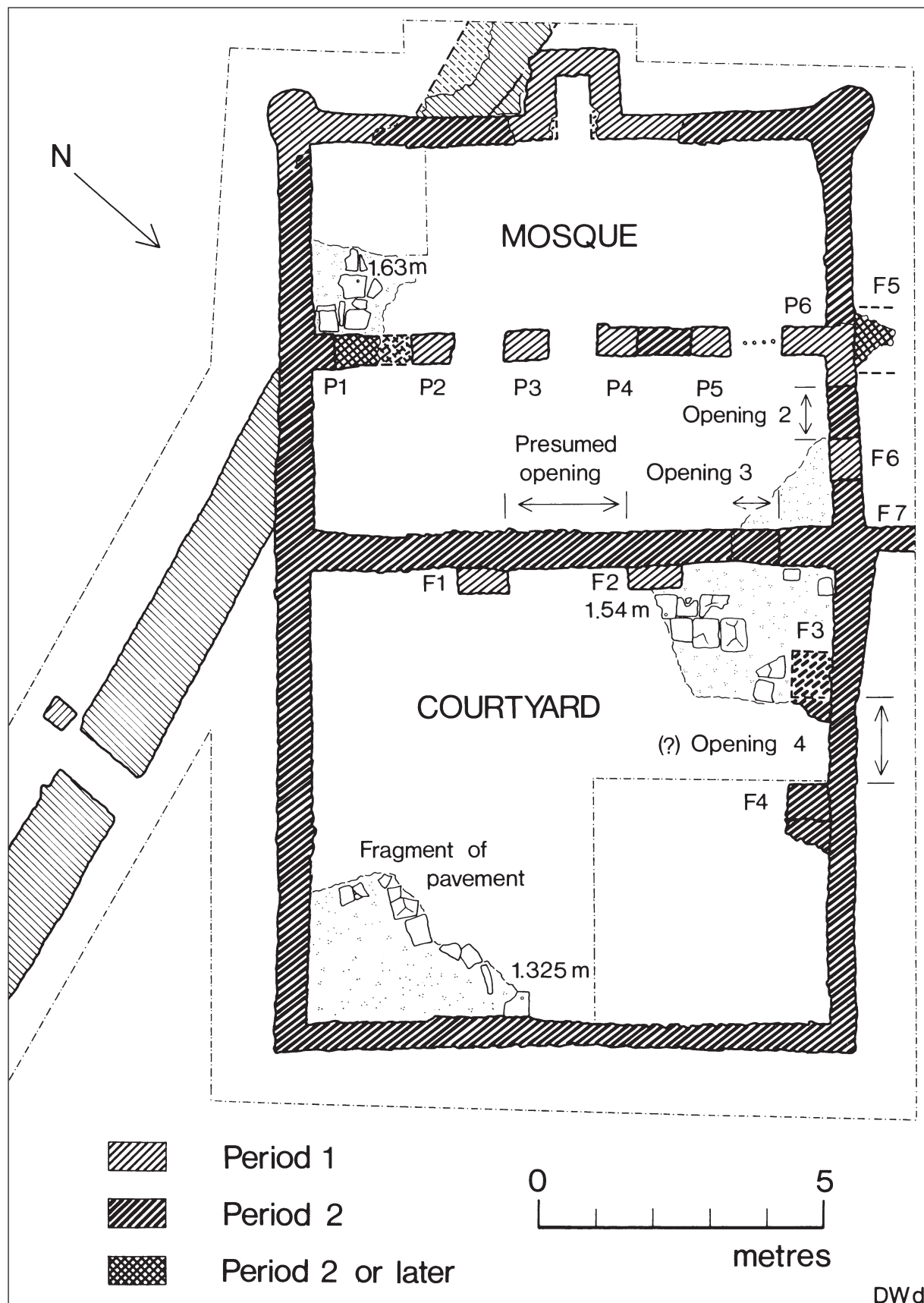


Figure 21. The mosque at Site M2. (Scale 1:100.)



Figure 22. Site B. A street and row of shops outside the Congregational Mosque.

contains shops, workshops and accommodation) in a traditional Mediterranean *sūq*.

The *hammām* was a small rectangular building measuring only 6 × 9 m internally, the walls and floors of which were waterproofed with *sārūj*. It was entered from the street and had six rooms. From (i) the vestibule, patrons went into (ii) the undressing room, which contained a small bath, presumably for washing the feet. Thence they visited, in the following order: (iii) the cold, (iv) warm and (v) hot bathrooms, before retracing their steps. The cold and warm room contained hand-filled baths, similar to that in room (ii). The hot room, on the other hand, had a built-in stone basin with running water supplied from a boiler above the furnace. The furnace also supplied hot air to the under-floor heating systems in rooms iv and v. The furnace was stoked from a sunken boiler-house, entered from building 2.

The mosque was typical of the smaller mosques at Siraf: it was a single room, up to 8.1 m wide and 6.6 m deep, divided by an arcade, with the *mihrāb* in a rectangular salient. We found evidence of four periods of construction between the mid-ninth and the late tenth centuries.



Figure 23. Site B. Shops outside the Congregational Mosque.

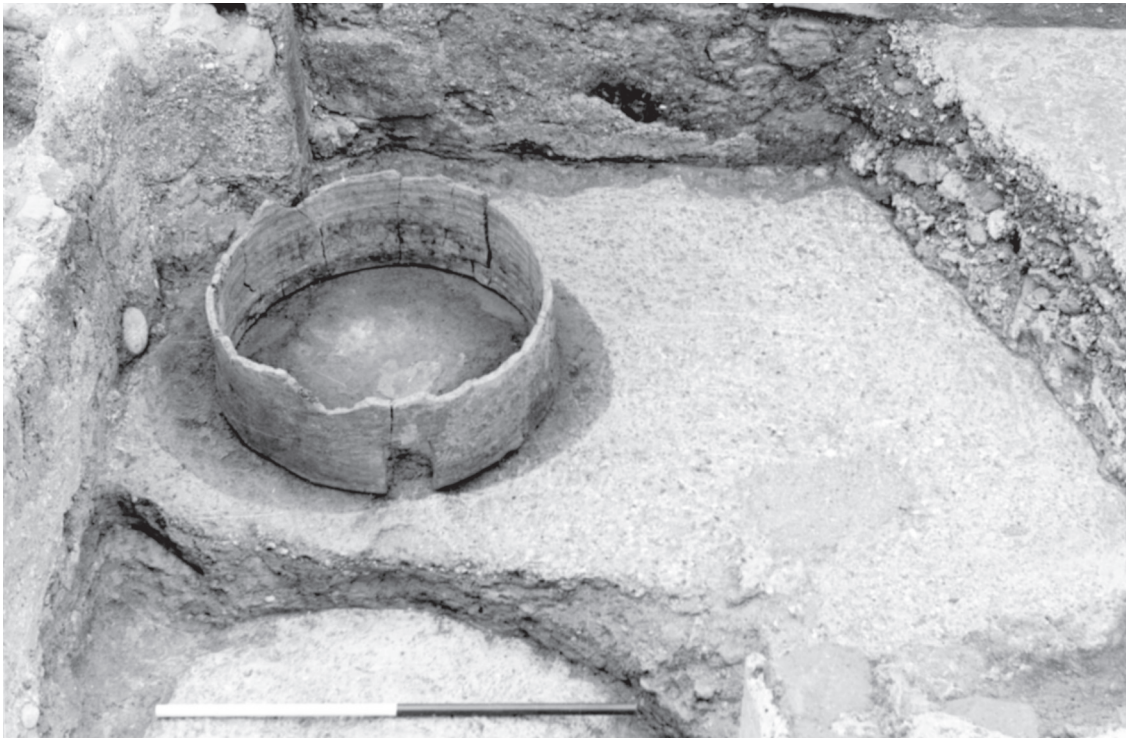


Figure 24. An oven in a shop outside the Congregational mosque.

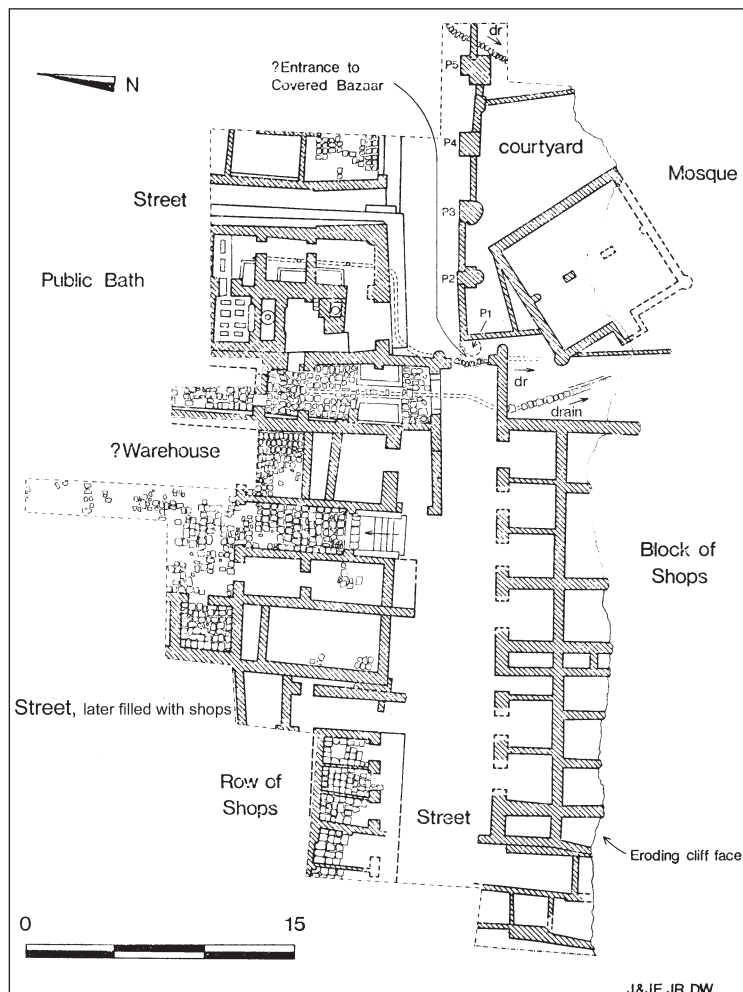


Figure 25. The bazaar at Site C.

5. Residential Quarters

The wealthiest residential quarters occupied rising ground above the congregational mosque and the bazaar. The survey revealed that much of the triangle enclosed by the fifteen-metre contour, the crest of the escarpment and the modern village, contained streets of impressive courtyard houses, comparable with the houses excavated at Site F (440450). On the highest – hence the coolest – parts of the ridge are the remains of at least five large complexes: at 476537, 486530, 495533, 505538 and 515540. We investigated one of them: Site K at 515540.

Surface remains suggested that the complex at Site K was more than 150 m long and 75 m wide (Fig. 26). On the south side, where the ridge slopes gently down towards the sea, we traced an enclosing wall for at least 108 m. Site K was a palatial residence, presumably that of a millionaire merchant, such as are mentioned by Al-Istakhri, or even of the governor himself (Whitehouse 1972a: 72–74; 1974: 9–12). Like the other large complexes, it comprised more than one building. At the west end, the ridge had been terraced to accommodate two buildings: Building A, which measured 29 × 31 m and contained two courtyards, stood on the lower platform, while Building B, which measured 37 × 38 m, stood on the upper platform (Fig. 27). Immediately east of Building B were Buildings C, G and F, and beyond these Buildings D and E.

The excavation at Site F of five houses provided a clear impression of the character of prosperous but less extravagant residences (Whitehouse 1969: 48–53; 1970: 9–15; 1971a: 5–10; 1971c). The area had a gridded street plan, with a road four metres wide running from east to west and narrow side streets separating one house from the next (Figs 28, 29 and 30). The streets had surfaces of trampled earth and gravel. Finds from the houses and streets showed unequivocally that no new construction, and very little occupation, took place after the tenth century (Whitehouse 1975).

Although each house was different, all shared the same basic components (Fig. 31). The entrance or entrances gave access to a paved courtyard, surrounded by rooms (Figs 32, 33 and 34). On the ground floor, nearly every room was entered from the yard (Figs 35 and 36), which suggests that it was the focal point

of communal activities. Although only one fragment of stucco survived *in situ*, the discovery of numerous fallen pieces showed that every house was decorated with carved or moulded plaster arranged in panels, friezes and pediments. Among the ornament were frequent “star and polygon” patterns, vegetal elements and Qur’anic inscriptions (Whitehouse 1968: 58, fig. 9 and pl. Vd; 1971: pl. XIa). The presence of star and polygon ornament in contexts no later than the tenth century is interesting, given the prevailing view that it was introduced in the Saljuq period, i.e. a century or more later.

Walls in Houses R and W survived to a height of four metres above the floor, indicating the existence of at least a second story. Despite this excellent state of preservation, we found only one window in the entire excavated area and it appears that, on the ground floor, rooms were lit by daylight entering through doorways from the yard – an arrangement which excluded noise and dust and at the same time provided at least a small antidote to the fierce heat of summer.

The houses at Site F were large. The largest of all, House W, occupied an area of 450 m², if one includes the paved area beneath the loggia at the south end. The house had two entrances from the street and twelve ground-floor rooms. Abutting on the north-west angle was a mosque. Even the smallest excavated house had an area of 270 m², with seven rooms surrounding the central yard.

Despite their impressive proportions and elaborate stucco ornament, the houses at Site F lacked many amenities which one associates with urban life. Sewers and a public water supply, for example, were completely lacking. Householders directed sewage and winter rainwater from the roof into covered, stone-lined pits in the side streets. The occupants of Houses E and W possessed private wells, but those in Houses N, R and S were compelled to fetch their water from the nearest available source. Nevertheless, despite these observations, our impression of Site F accords well with al-Istakhri’s description of fine houses, on which merchants lavished large sums of money.

Two buildings (Fig. 37) at Site M1 (420496) resembled the houses at Site F and may have been domestic, although in one case we suspected a commercial function (Whitehouse 1974: 14).

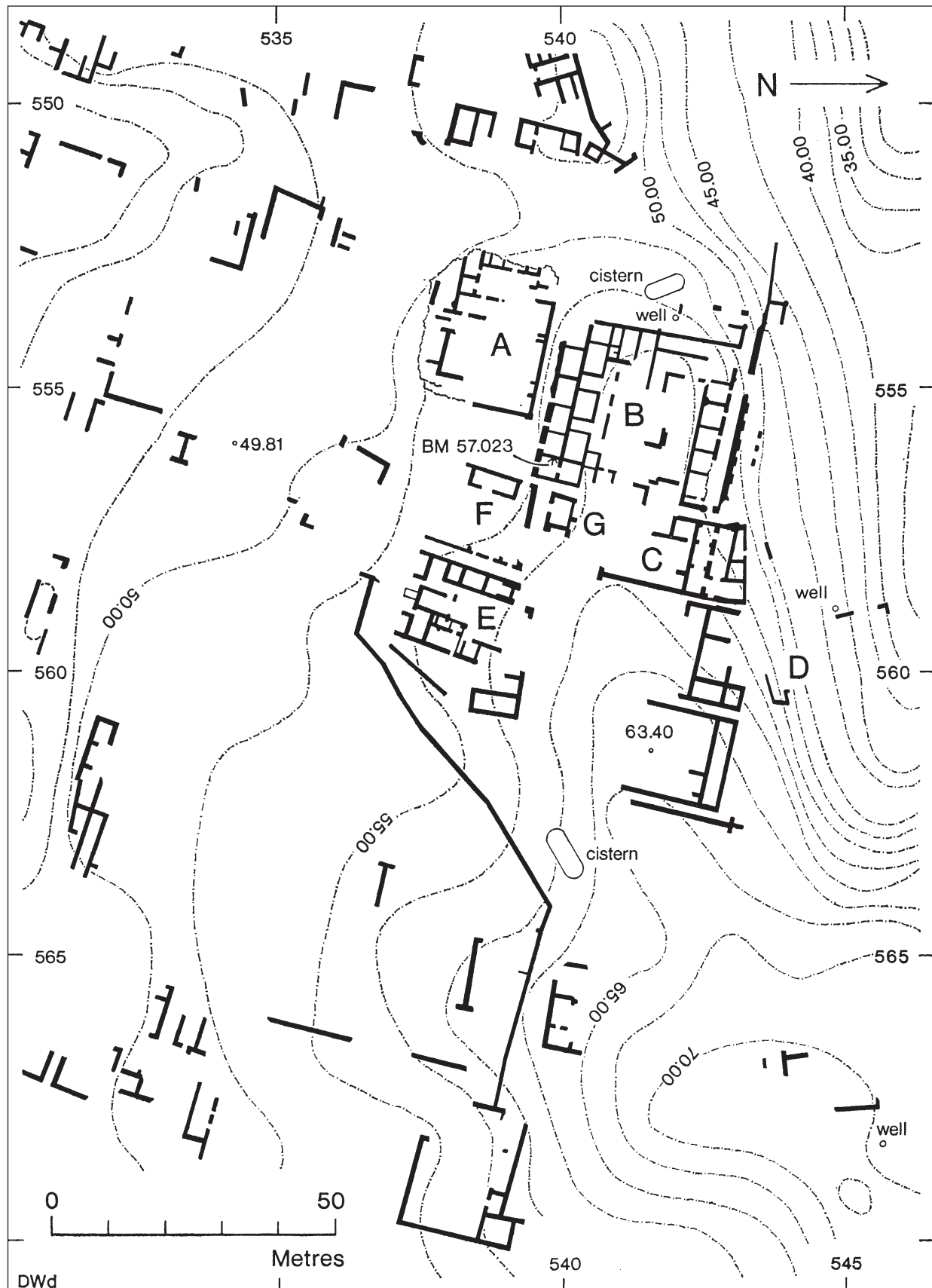


Figure 26. The palace at Site K. (Scale 1:1000.)

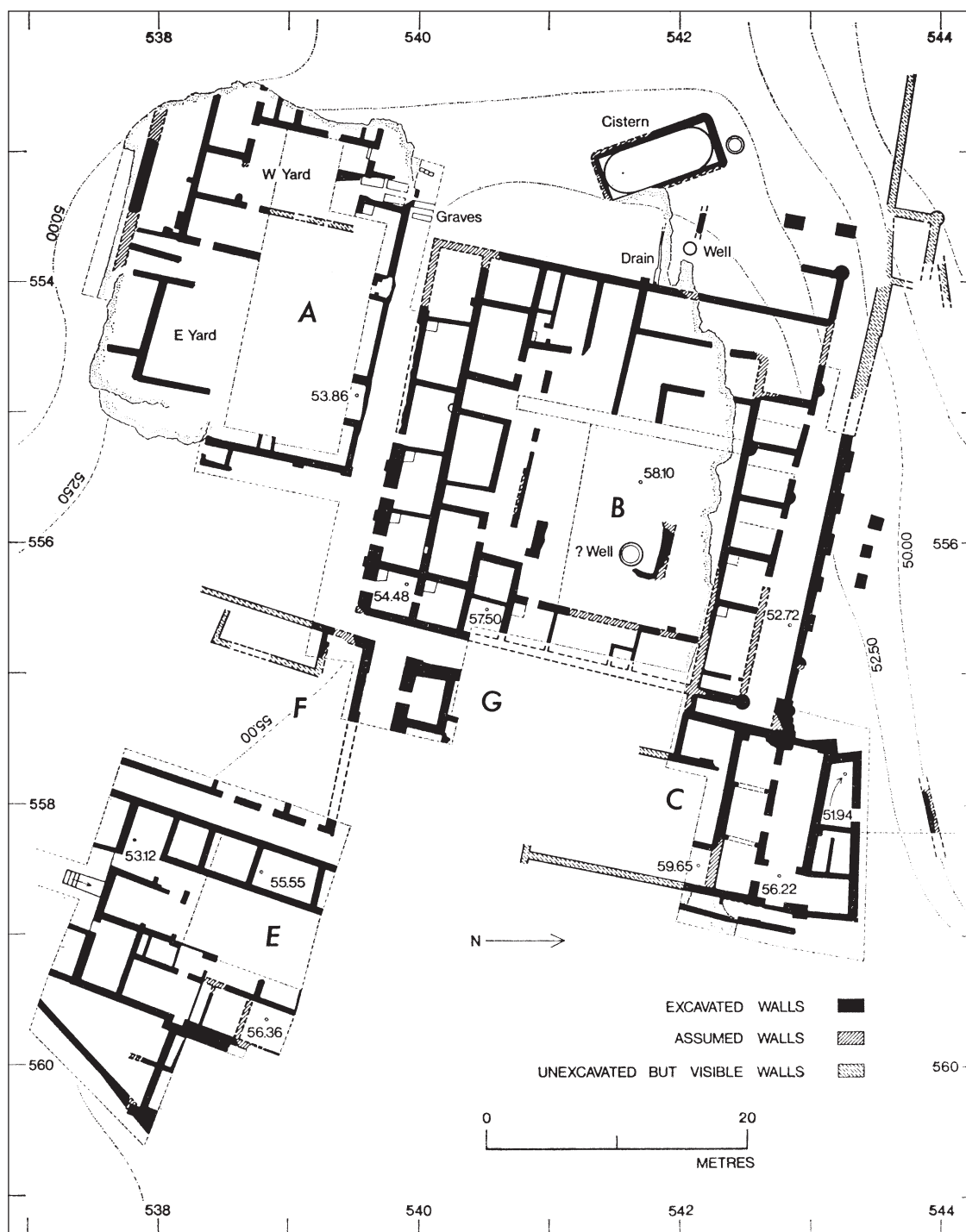


Figure 27. Buildings A, B, C, E, F and G in the palace at Site K. (Scale 1:500.)

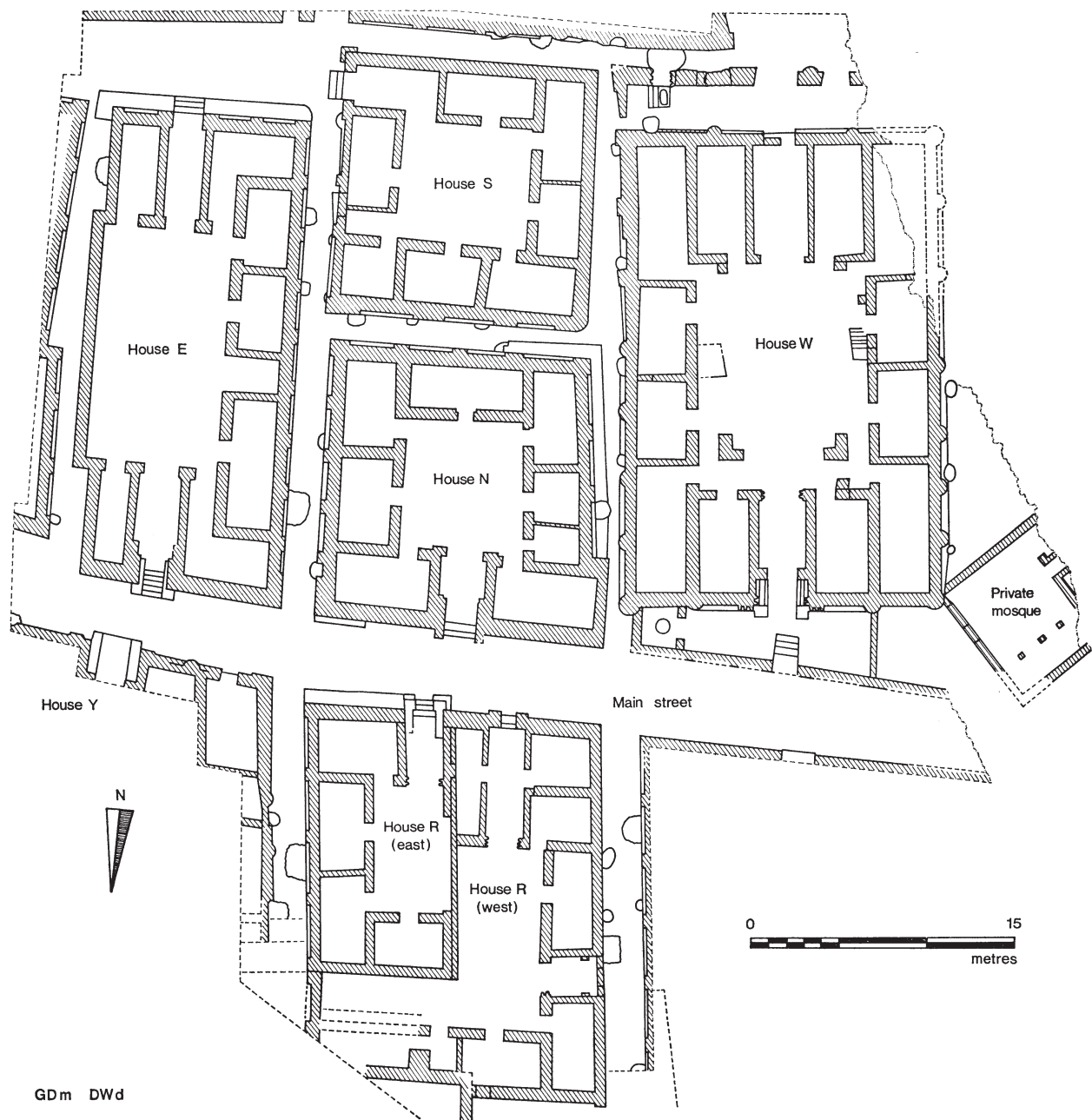


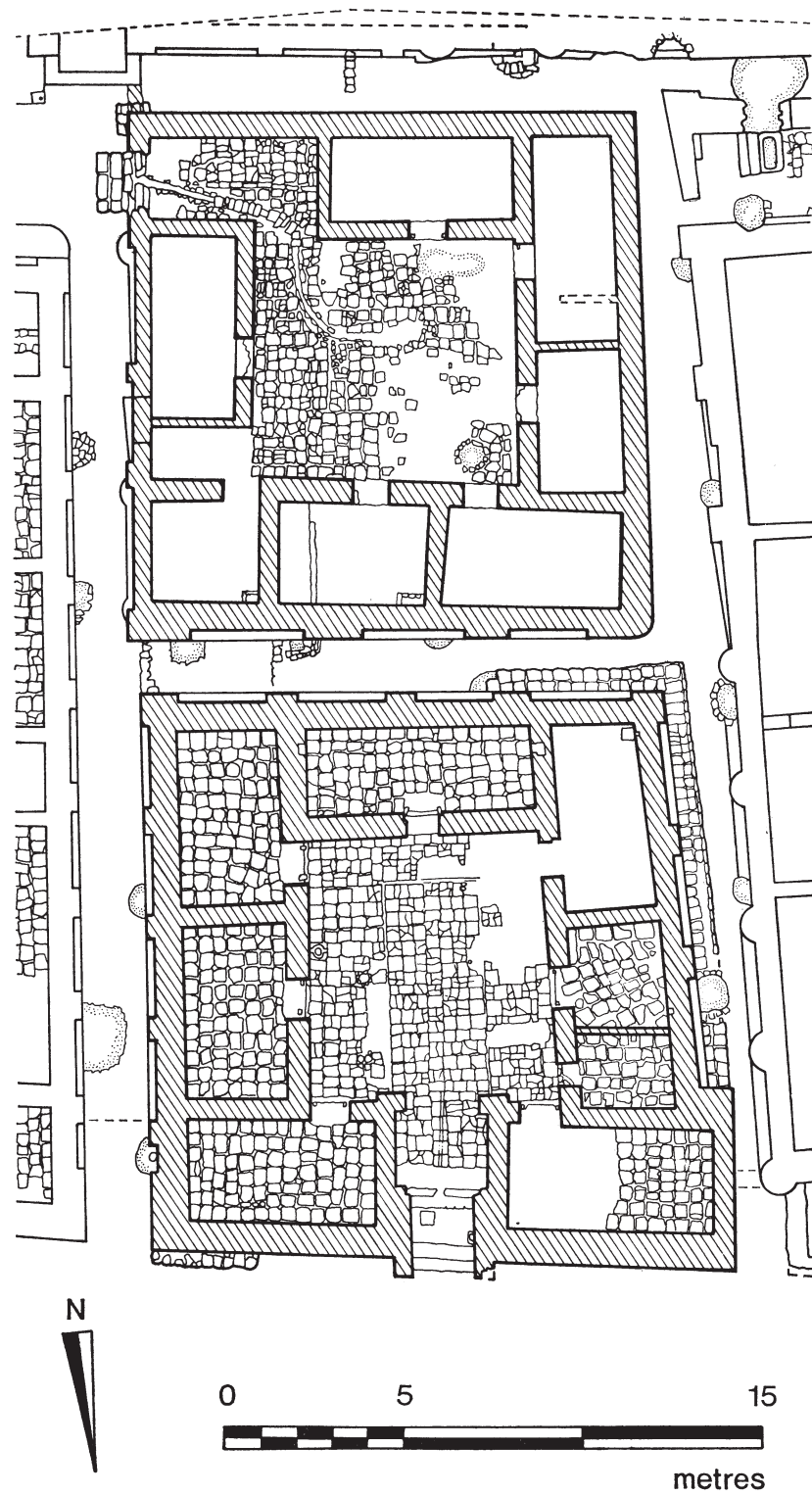
Figure 28. The residential quarter at Site F.



Figure 29. The alley between Houses W and N.



Figure 30. Site F. House S with a street in the foreground.



GD&CLm DWd

Figure 31. Houses N (above) and S (below) at Site F.



Figure 32. Site F. The façade of House W.



Figure 33. Site F. Parts of the courtyard and main entrance passage of House W.

Figure 34. Site F. Houses R (in the foreground), E (on the left), N and S (in the centre) and W (on the right).



Figure 35. Site F. The courtyard of House N, looking towards the entrance.



Figure 36 Site F. House E.



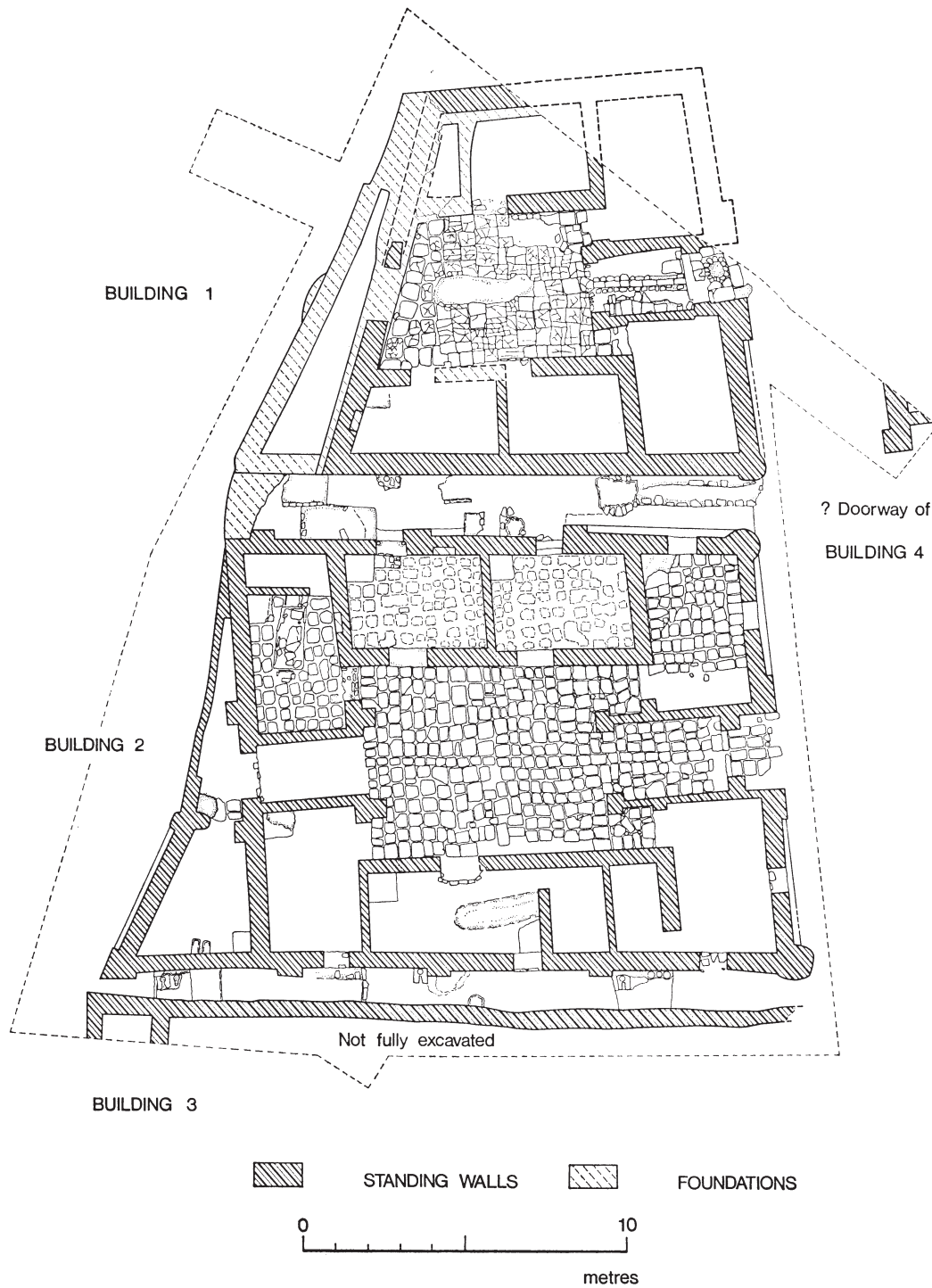


Figure 37. Site M1. (Scale 1:200.)

6. The Potters' Quarter

The potters' quarter (Site D, at 355478) was near the western edge of Siraf, immediately above the beach and only 50 m from the city wall (Whitehouse 1968: 12–14; 1971: 12–15; 1972a: 84). The site was well chosen.

The risks of fire and pollution were more acceptable on the edge of town than nearer to the centre; land would have been cheaper; raw materials from the hinterland reached the factory without traversing the city, and pots destined for foreign markets could be placed

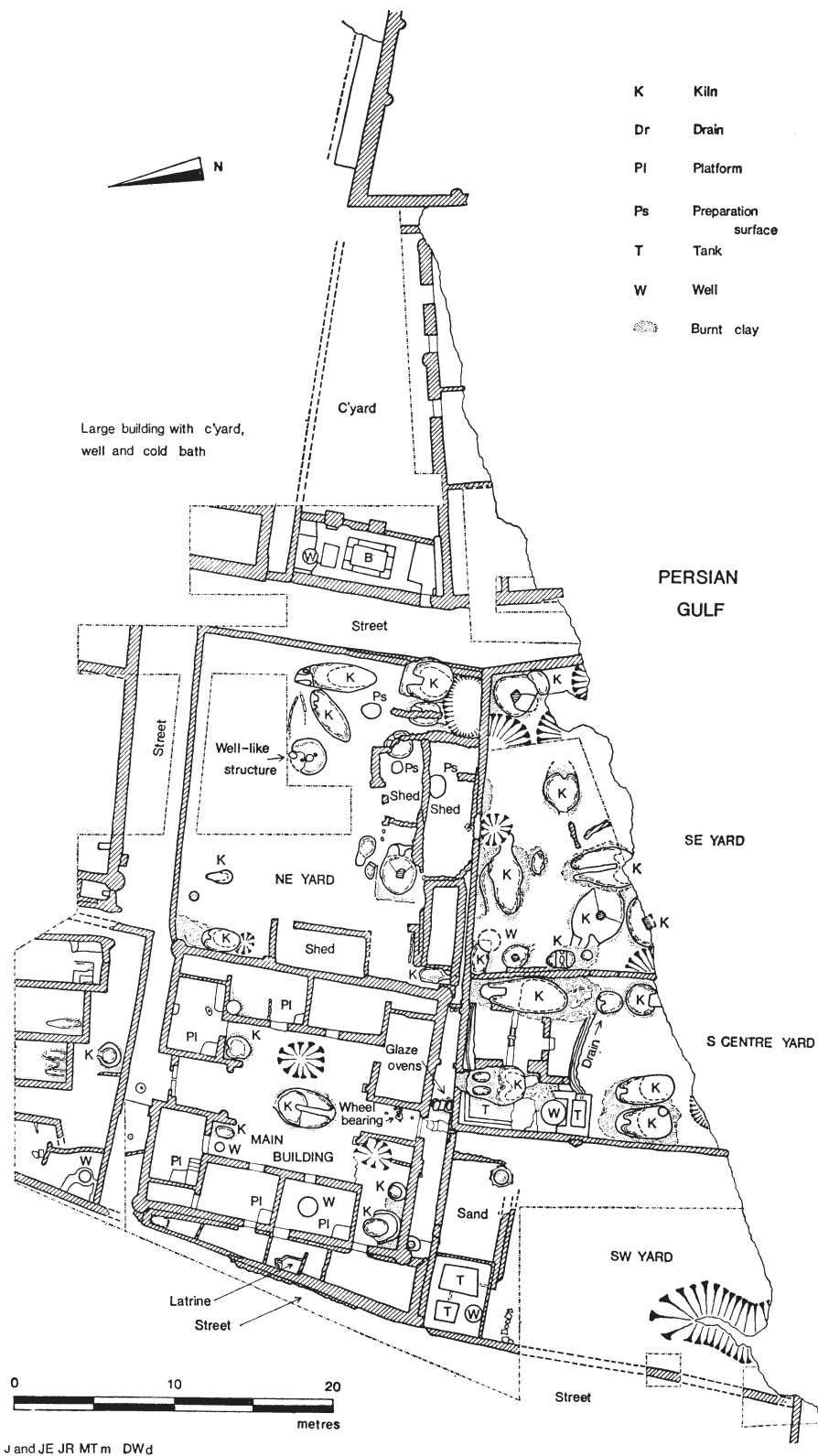


Figure 38. The potters' quarter at Site D.

in small boats at the water's edge for transference to larger vessels anchored in the bay.

The potters' quarter (Fig. 38) contained more than one manufactory. We excavated the greater part of one, and sampled another. The former appears to have

occupied an entire city block, with streets on the north, east and west sides and the sea to the south. The overall dimensions were at least 45×42 m. In the north-west angle stood a large building entered from the street. In the north-east angle was a yard containing workshops,



Figure 39. Site D. A kiln constructed in a disused cistern.

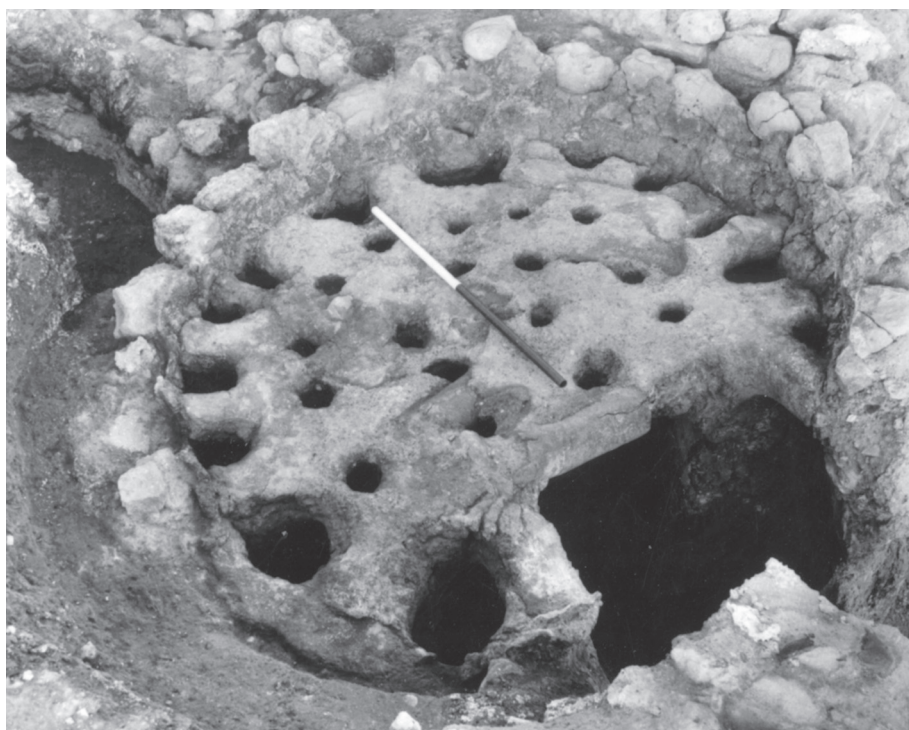


Figure 40. Site D. A kiln with most of the floor preserved.

kilns (Figs 39, 40 and 41) and surfaces for preparing clay. To the south lay two other yards, one with a cistern. A fourth yard occupied the south-east angle of the site. The large building was approximately 17 m². The ground floor had a symmetrical plan comprising

two entrances, eight rooms and a central courtyard. Its original function is uncertain, but the plan suggests that it may have been a house.

Whatever its intended function, the building was soon adapted for use as a potters' workshop. One

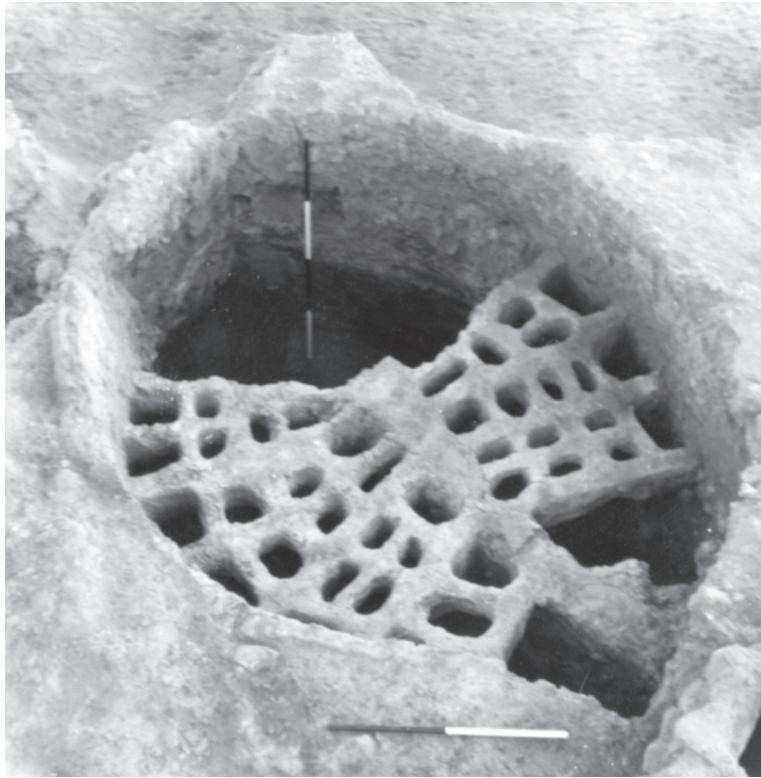


Figure 41. Site D. A kiln with most of the floor preserved



Figure 42 Site D. The base of a potter's wheel.

entrance was blocked and a potters' wheel was built in the passage. The rooms in the south-west angle were demolished to make way for kilns. Additional kilns were built in the courtyard. Another room contained traces of a platform or bench, together with the bearing (not in situ) of a second potters' wheel (Fig. 42).

The potters' quarter flourished in the tenth century A.D. It produced a wide range of forms, from small "eggshell" ware jugs to large water pots. There was no evidence, however, for the regular production of glazed objects.

7. Cemeteries

As one would expect, the cemeteries of Islamic Siraf consisted mainly of rock-cut graves, each intended to receive a single inhumation. While the majority was aligned approximately north-south, a significant minority pointed east-west and numerous examples simply filled the available spaces. Most graves measured some $1.7 \times 0.5 \times 0.6$ m deep. They had vertical or splayed sides, the latter giving greater width at the bottom. Many were equipped with offsets or horizontal grooves in the sides to support the row of stone slabs, which covered the body. Above the slabs, the grave was backfilled with earth or rubble. It is likely that many were marked by plinths of mortared rubble; others had oval, plaster-covered "domes" (cf. Whitehouse 1974: pl. IXb) or inscribed stone or stucco grave covers (Fig. 43; Lowick 1985: 79–86), one of which bears the date 383 [993] and is inscribed with an unusually early example of elaborately plaited Kufic (Fig. 44). Today, however, most of the visible graves are empty, having been opened by villagers intent on salvaging the slabs for reuse as paving stones.

Again as one would expect, most of the cemeteries were situated on the edge of the city, usually on high ground, which was too steep or inaccessible to recommend it for building. Thus in the general vicinity of 350550, the escarpment above Bagh-i Shaikh contained hundreds of visible graves, and many more were assumed to be obscured by rubble. Similarly, the edges of the escarpment to the east of Site G (from 413546 to 439554) were crowded with graves, as was the opposite site of Shilau Valley (from 428530 to 451538). In the first case probably, and in the second case certainly, the cemetery extended away from the escarpment for tens of metres and, as above Bagh-i Shaikh, the total number of graves was at least in the hundreds.

The largest cemeteries, however, were on the north side of the Shilau Valley, in the vicinities of 415525 and

465525 respectively. They occupied the sloping floors of abandoned quarries, and were associated with wells and small enclosures, which may have contained areas reserved for individual families. Access to the higher slopes was facilitated by flights of rock-cut steps. The very extensive cemetery (415525) was the most striking remnant of the Islamic city, before excavations began (Fig. 45; cf. Whitehouse 1968: pl. IIa; 1970: pl. 5).

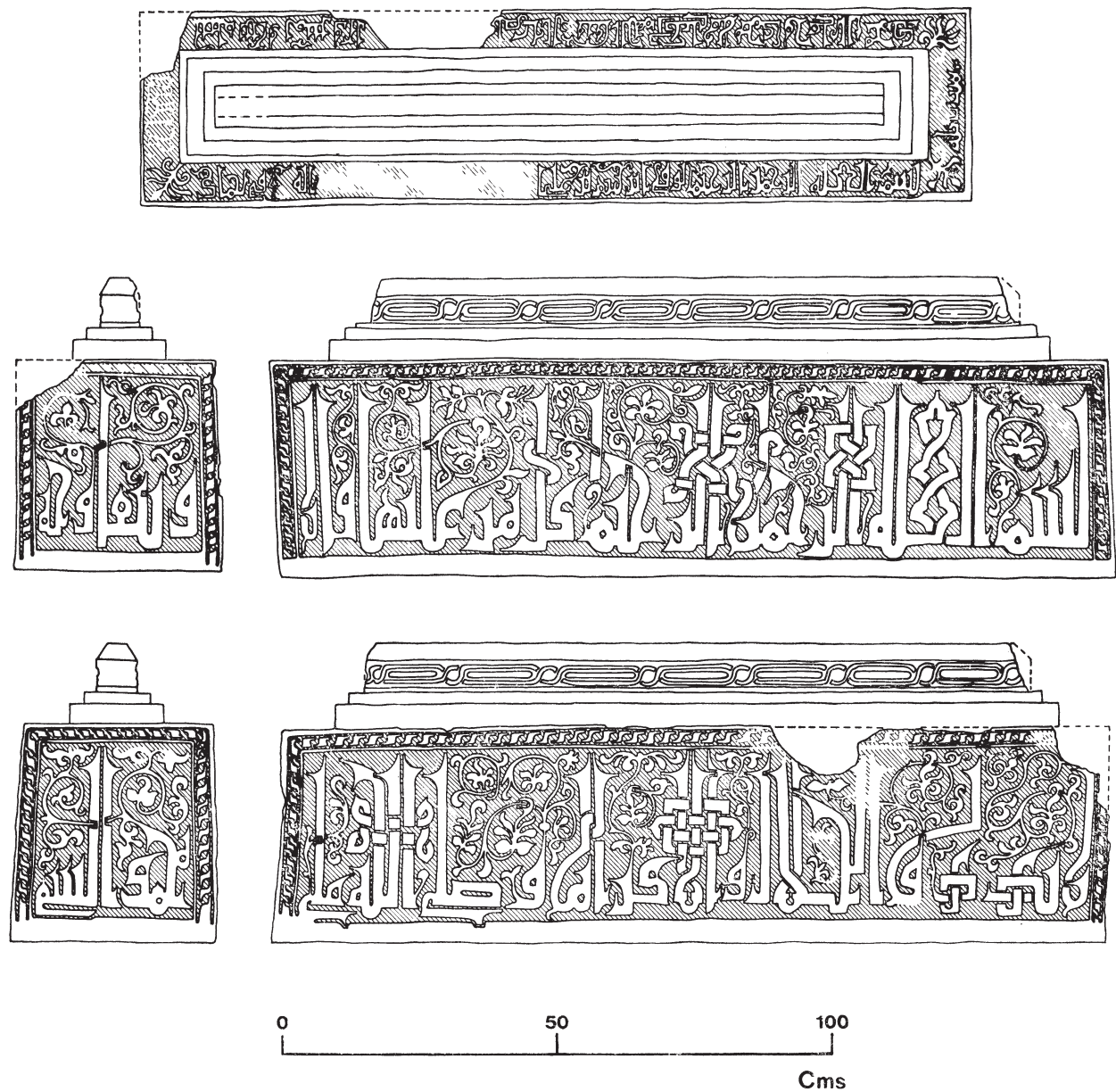
Other Islamic cemeteries were recorded at 472538 (near the imamzada at Site H and so perhaps later than the main period of occupation: see p. 7) and at 488535, 497550, 505545 and 540536.

There are, however, several exceptions to the rule that cemeteries were confined to the edge of the city. The excavation of the palace at Site K, for example, revealed a group of graves with stucco markers, adjacent to Building A (Whitehouse 1974: 11, fig. 5 and pl. IIIc; Lowick 1985: 112–13, nos. 60–1). While the graves at Site K presumably comprised the private cemetery of the occupants of the palace, no such explanation can be advanced for a larger, apparently walled cemetery in the vicinity of 415495. This occupied an irregular depression near the shore (Whitehouse 1974: 12). Although we failed to recover firm evidence for the date of this cemetery, we concluded that it probably came into existence before the city expanded this far west from its nucleus around the congregational mosque.

The most unusual of the city's cemeteries, at Site O (410555), consisted of some forty monumental tombs (Figs 46 and 47; Whitehouse 1974: 23–30). The tombs occupied a spur overlooking the west end of the city, immediately north of the mosque at Site G (Fig. 48). The spur runs from north to south, ending in a plateau. On either side the ground falls almost vertically into deep ravines. The cemetery occupied the plateau and part of the spur, an area measuring 100×150 m, with outlying tombs across the ravine to the east. We excavated ten tombs and exposed parts of two others. Surface remains suggested that the cemetery contained at least twenty-eight similar buildings. The tombs (Fig. 49) were square or rectangular and in one case (tomb D) fallen masonry showed that the structure was at least 6.9 m high. The cemetery, therefore, was impressive; the tombs were comparable in size with the Tomb of Isma'il the Samanid at Bukhara and they outnumbered the sixteen tombs of the Shah-i Zindeh at Samarqand. Every excavated tomb was intended to receive multiple corpses, which remained unburied. Despite this surprising discovery, we found unequivocal evidence that the cemetery was used – and may have been built – in the ninth and tenth centuries. The tombs were surrounded by graves, a few of which had stone or stucco covers with Qur'anic inscriptions



Figure 43. Inscribed grave cover.



LBm DWd

Figure 44. Stone grave cover dated 383/993.



Figure 45. The largest cemetery at Siraf.



Figure 46. Site O. Part of the monumental cemetery.



Figure 47. A group of astodans.

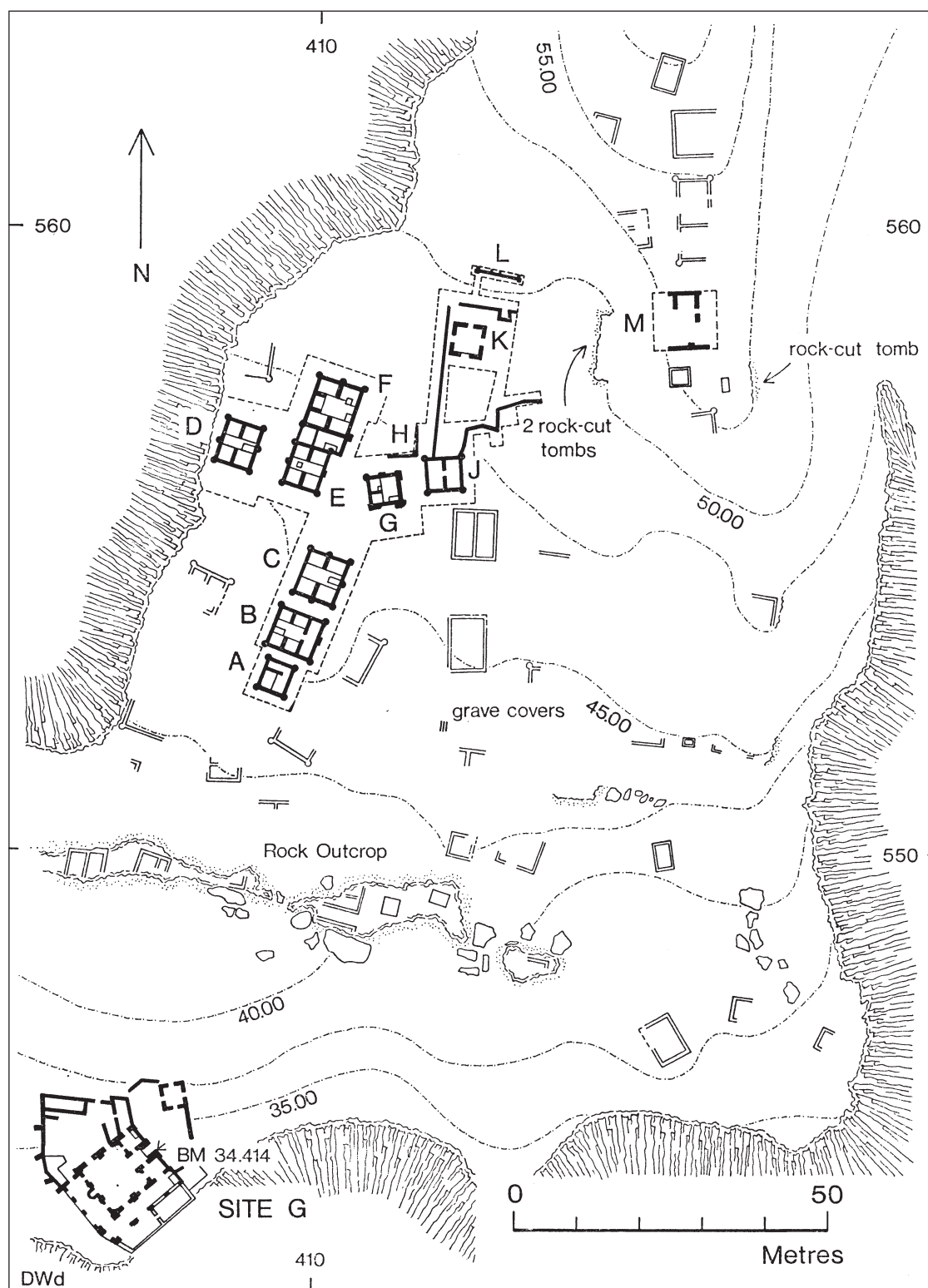


Figure 48. The monumental cemetery at Site O. (Scale 1:1000.)

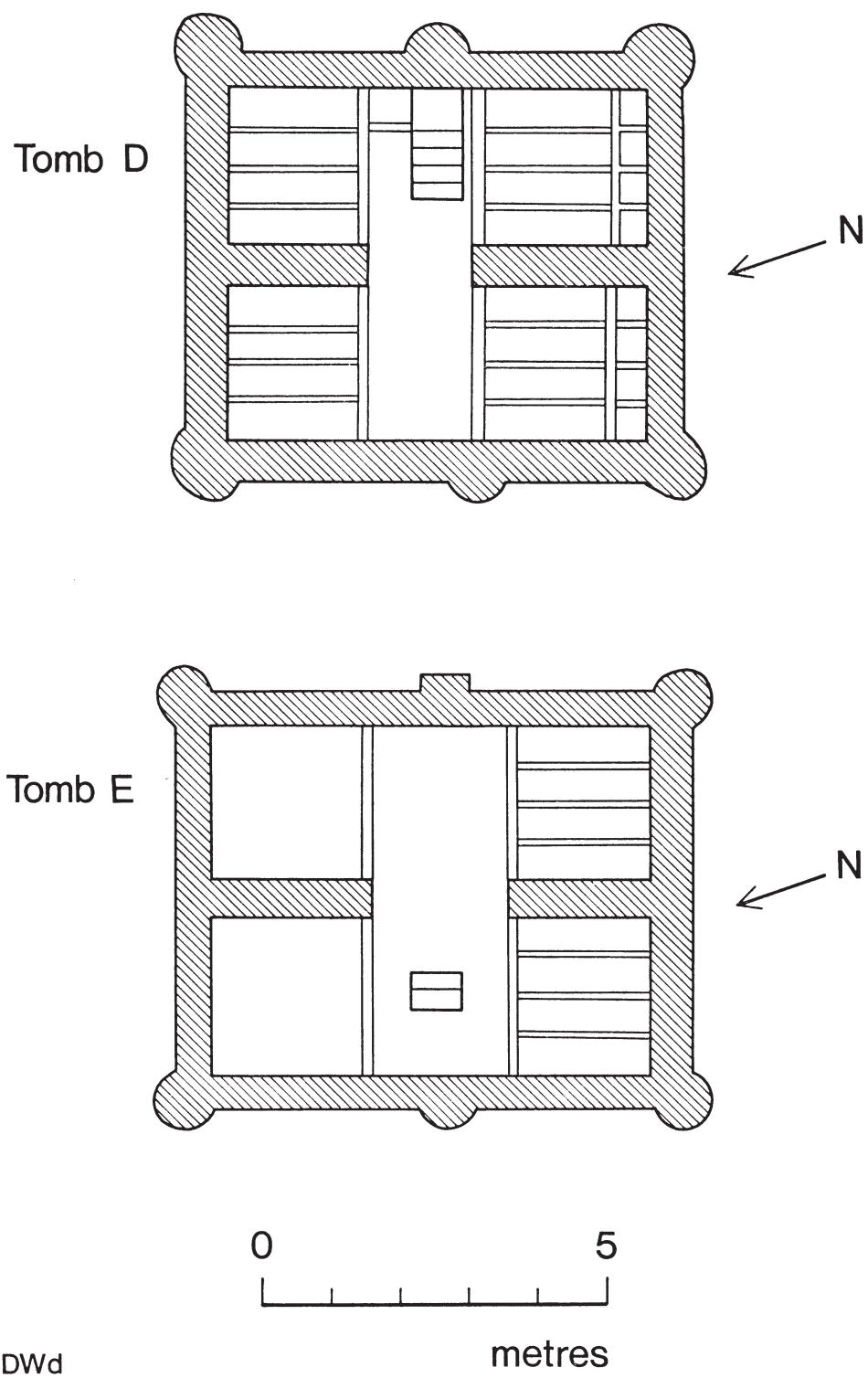


Figure 49. Site O. Tombs D and E. (Scale 1:100.)

(e.g. Lowick 1985: 113, no. 3). The identity of the sect, which built the cemetery at Site O, is unknown.

8. Other Features

Three other sites yielded information about Siraf in the period between about 800 and 1000: A, N and P1.

Site A (467496) is the location of the exploratory sounding excavated at the beginning of the first season (Whitehouse 1968: 5–9). The sounding revealed some seven metres of archaeological deposit, including part of a substantial structure, built in the ninth century and rebuilt on at least four occasions before it was abandoned in the eleventh or twelfth century A.D. In every period, the excavated remains consisted of a range of rooms, apparently flanking a courtyard. Although the structure may well have been domestic, the presence in one phase of the base of a press, similar to traditional oil presses in the bazaar at Isfahan, suggests the alternative possibility that, like the building with a courtyard at Site C (498497), it had a commercial function, in which case the bazaar may have extended for some distance west of the congregational mosque.

At Site N (363496), we excavated a small rectangular building divided by two rows of piers into a “nave” and “aisles” (Fig. 50; Whitehouse 1974: 20–21). We

found no clear evidence for the function of the building, which is without parallel elsewhere at Siraf. Two possibilities are: (1) that it served as the *majlis* for residents in this quarter of the city and (2) that it was a church.

Finally, excavations at Site P1 (432488), near the shore, revealed that one of the small mosques, noted on p. 26, was converted in the tenth century into a workshop for processing a black tar-like substance (Fig. 51; Whitehouse 1974: 18). This conversion took place before the construction of the “emergency” defences (p. 21) and the workshop continued to function for some time afterwards. The former mosque was divided into three rooms, one of which contained the impressions of two rows of containers set in the floor. Throughout the area, floors were encrusted with the black substance. The discovery of the rib of a whale suggests that the substance is blubber and not bitumen, as we first supposed. According to al-Idrisi and others, whale and shark oil were used in the Persian Gulf for caulking hulls and, if the substance is indeed blubber, it would be reasonable to conjecture that the beach in the vicinity of Site P1 was used by shipwrights. We suspect, therefore, that the beach below the western part of the city was the scene of at least three activities: repairing and building ships, loading pottery from Site D and handling merchandise bought and sold in the bazaar.

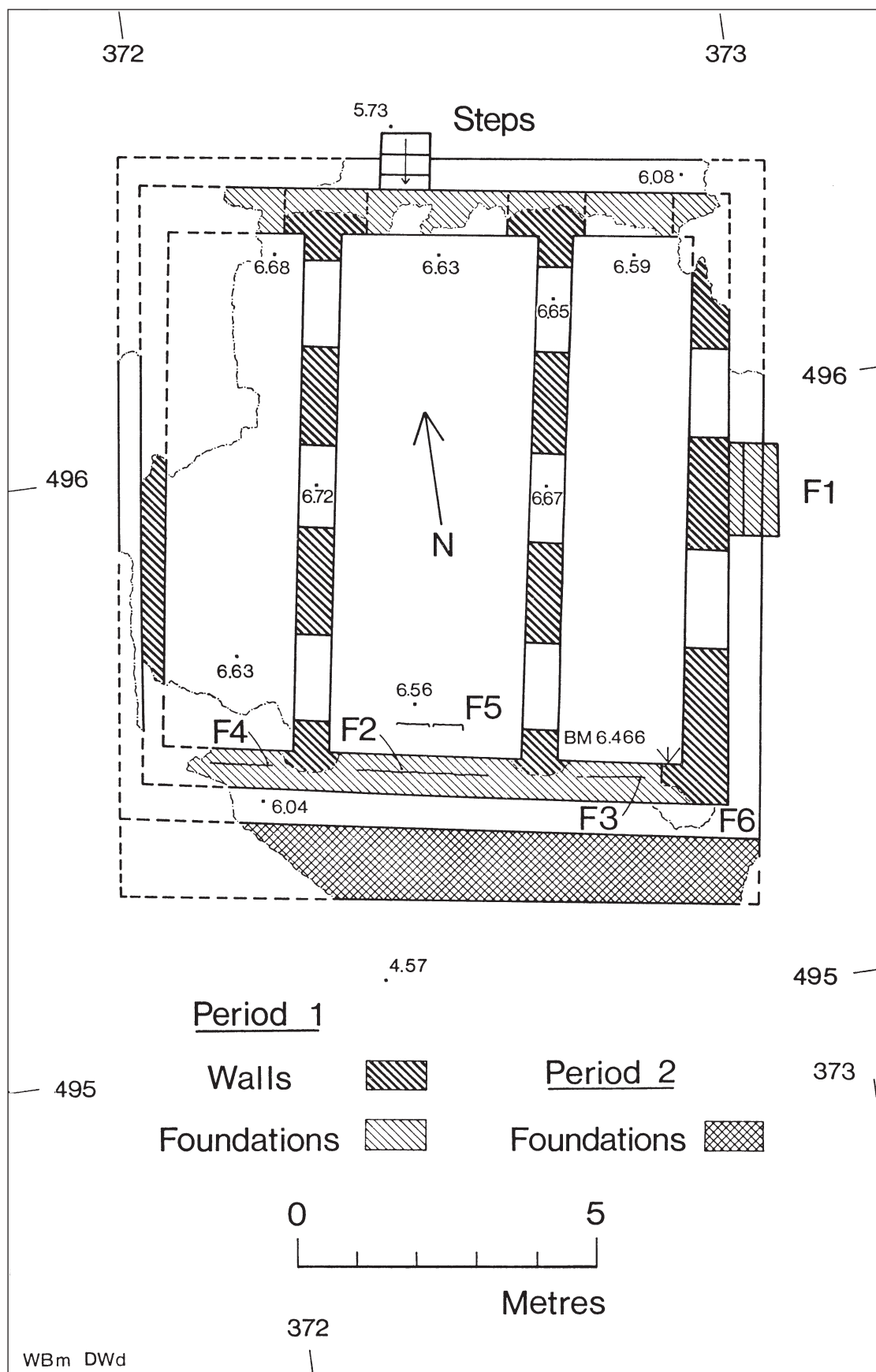


Figure 50. The unidentified building at Site N. (Scale 1:100.)

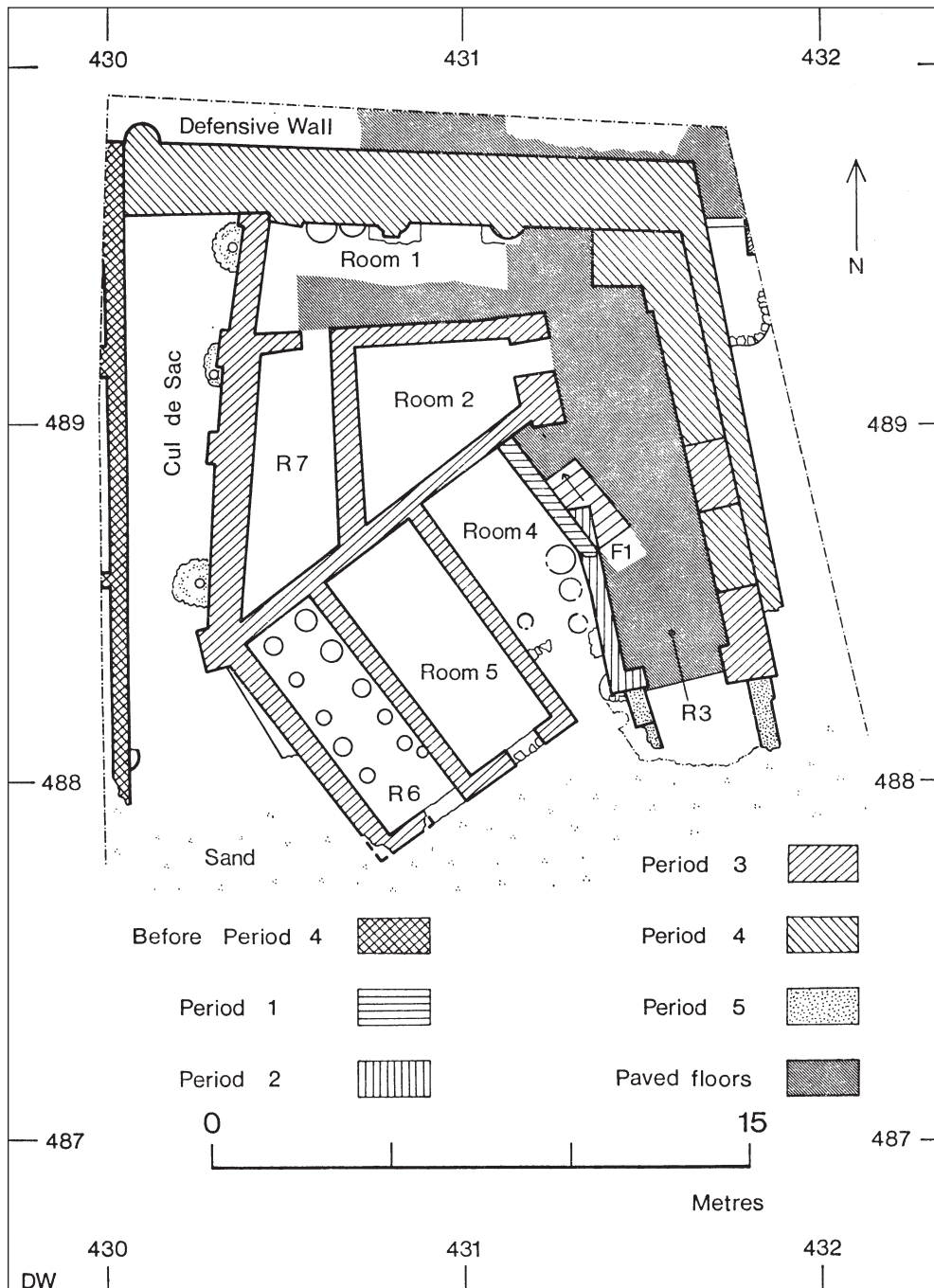


Figure 51. Site P1. (Scale 1:200.)

Chapter 4

The Hinterland

T. J. Wilkinson

Siraf is at the foot of the Zagros Mountains, which consist of folded and deformed anticlines and synclines trending NW to SE, parallel to the Iranian coast of the Persian Gulf. Folding occurred during the late Alpine orogeny of Pliocene and Pleistocene times, and is probably continuing today, for the area is still seismically unstable (we experienced several tremors between 1966 and 1973) and records of earthquakes extend back to at least A.D. 977 (see p. 14). However, no seismic faults were observed in the field, although a faulting episode occurred in the Minab area of southern Iran between 7000 and 1250 B.P. (Vita-Finzi and Ghorashi 1977).

The topography consists of folded and heavily dissected sedimentary rocks laid down in a sequence from Cretaceous to Pleistocene times. The local sequence may be subdivided into the following rock units (Fig. 52):

1. The Gachsaran series. These are mainly limestones, which occupy the core of the Namak anticline in the north-western part of the area. They form relatively high, bare hills deeply dissected by the gorges of seasonal rivers, such as the Gharba Rud.
2. The limestones of the Kuh-i Haft Chah (Fig. 53). These take the form of folded ridges trending from NW to SE in the northeastern part of the area shown in Fig. 54. They attain altitudes of approximately 1500 m and have a thin soil colonised by a low semi-arid scrub. This cover has been relatively well preserved from erosion and the valleys appear less gorge-like than those of the Gachsaran series. Both the Gachsaran and the Kuh-i Haft Chah geological units create considerable barriers to movement between the coast and the interior.
3. The Mishan series scarplands. These Upper Miocene limestones and sandstones form escarpments with dips between 12° and 30°, the orientation of which varies depending upon their location on the Namak anticline. Valleys are frequently gorge-like and hill slopes are either bare or covered with thin, patchy calcareous lithosol.
4. The Agha Jari scarplands and badlands (Fig. 55). Here, Miocene to Pliocene marls with interbedded gypsum predominate, while thin sandstone and limestone beds form resistant layers. Towards the axis of the anticline they have been stripped from the Mishan series and are now undergoing gully erosion down to the base level of the main rivers. The scenery, like that of the Mishan Series, consists of escarpments with intervening vales but in addition large areas of densely gullied marls bereft of vegetation lend a chaotic appearance to the landscape.
5. The Bakhtiari escarpment. This forms the outer shell of the Namak anticline and stretches as an escarpment, less than 200 m high, along the coast from Akhtar to Parak. The Early Bakhtiari, forming the bulk of the escarpment, consists of relatively resistant beds of sandstones and conglomerates of Pliocene date. These dip towards the sea at approximately 15°–30°, creating a jagged “saw tooth” scarp crest. The escarpment itself is dissected at intervals by deep gorges or tangs (Fig. 56). The Late Bakhtiari consists mainly of sandstones dipping towards the sea at 5°–10°, which form an unconformable capping to the Early Bakhtiari. This series is evident at Siraf, where it forms a low bench on which sites G, H, K and O are located.
6. The coastal plain is a narrow, discontinuous lowland rarely more than one kilometre wide. The coastal

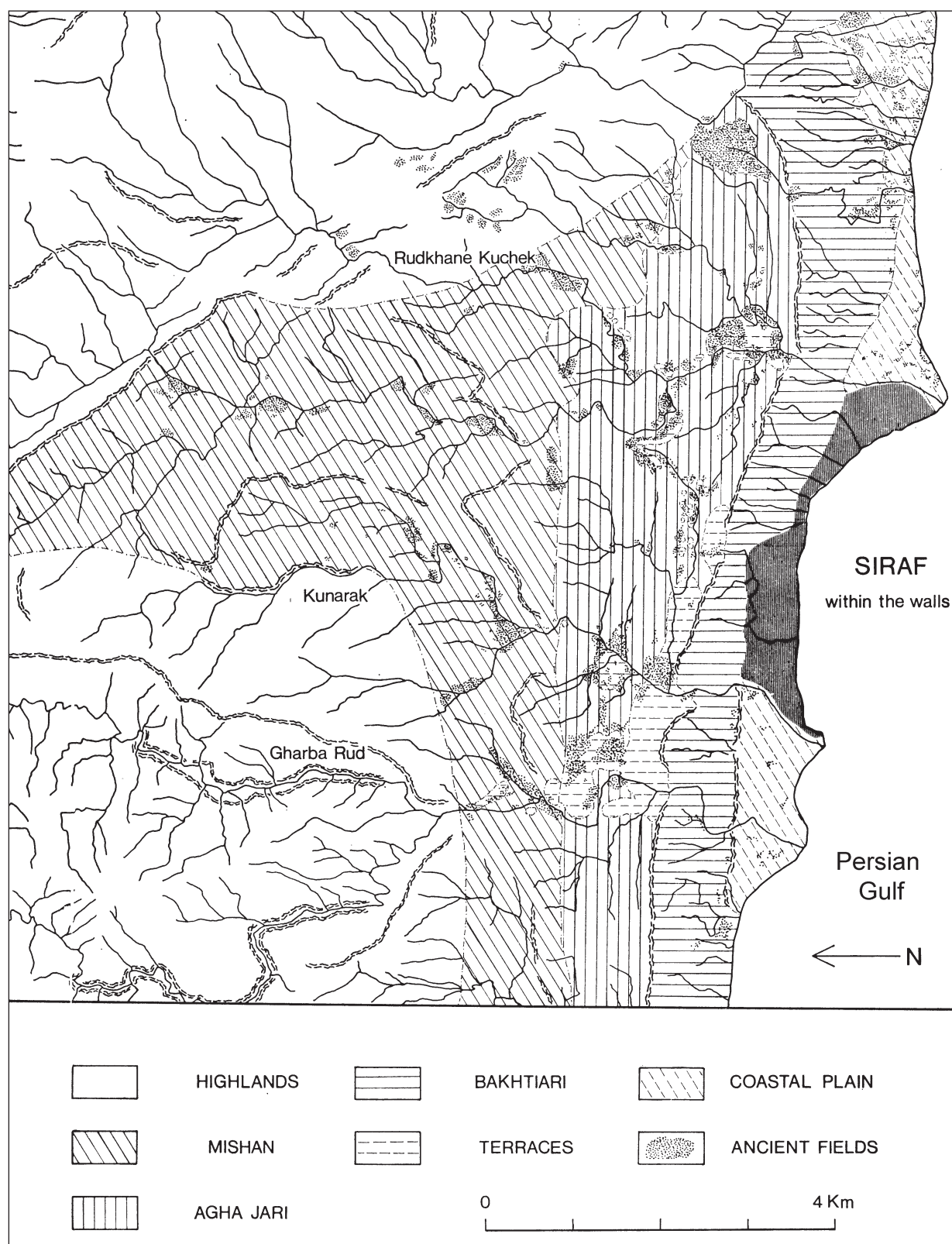


Figure 52. Siraf, the city its hinterland.



Figure 53. Small area of relict fields within the upland of the Kuh i-Haft Chah.

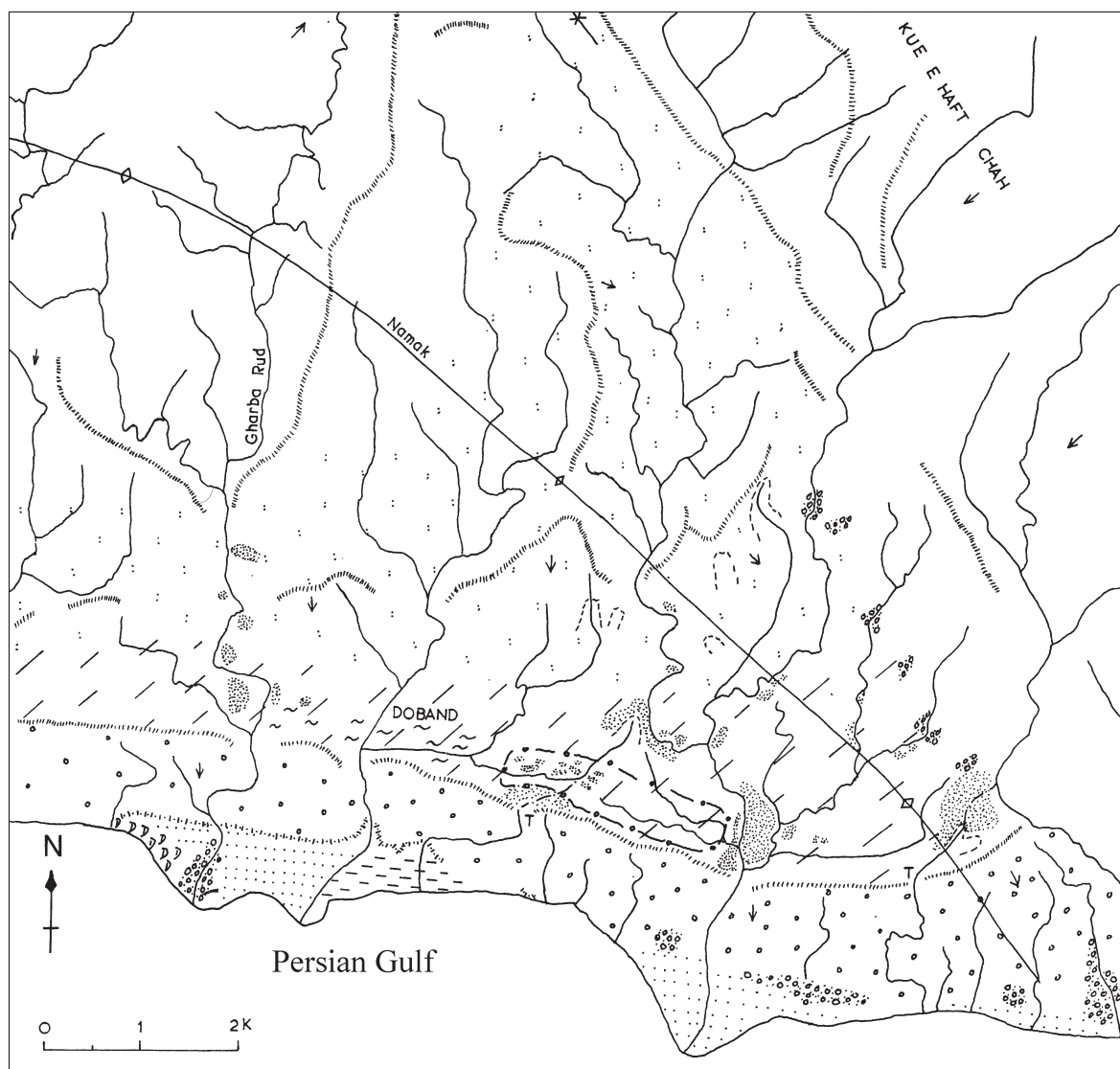
outline is periodically punctuated by the bulging deltas of usually dry river beds and the intervening narrow plains are formed of sediments derived from the nearby escarpment. In the area mapped, tidal flats and lagoons are virtually absent, although the presence of such deposits beneath Siraf suggest that once they were more extensive. In one area, the coastal plain is obscured by partly vegetated sand dunes.

Erosion and Sedimentation

During the Quaternary period, the area was intensively sculpted by fluvial erosion. Today such erosion is concentrated in the winter months of October to April, when rainfall can vary from 120 to 400 mm. Summers are hot, with a mean monthly temperature in July of about 33°C, which contrasts with the January mean of 16°C. The period of maximum rainfall therefore coincides with that of lowest evaporation; consequently,

when rainfall occurs (sometimes as semitropical storms), runoff from the sparsely vegetated slopes can be very rapid indeed. This process is most pronounced on the Mishan and Agha Jari series, whereas on the Kuh-i Haft Chah and on the coastal escarpment runoff, although still rapid, is lessened slightly by infiltration and, in the highlands, by the presence of a patchy cover of juniper scrub. This high runoff tends to strip soils off the sandstones and limestones and carve gullies in the marls. Also, if resistant beds overlie marls, undercutting and associated slumping frequently result. Consequently, the limestone and sandstones have been denuded of all but small pockets of soil, except in the Kuh-i Haft Chah series. On the marls, gullying has produced classic "badland" scenery in areas of former cultivation and the high sediment yields from these areas has led to sedimentation on some nearby archaeological features.

The combination of occasional storm rainfall and bare rock surfaces leads to a rapid evacuation of



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| | | } eroded anticlinal trough |
| | | |

Coastal plain : Silts and sands washed from escarpment and in river deltas

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Figure 54. Geology and physiography of the Siraf area.



Figure 55. Heavily eroded badlands of the Agha Jari series rocks viewed from the top of the coastal escarpment (on the Bakhtiari formation).

water and sediment, with the result that water levels in rivers reach a muddy peak very rapidly and most of the water is discharged within twenty-four hours. Consequently, most rainfall flows straight into the sea via rivers and there is very little recharge of the water table. Field work suggested that, before and during the development of Siraf, both soils and gravel terraces were more extensive inland of the coastal escarpment; this would have increased interception of rainfall and probably increased ground water recharge to slightly above that of today. Such a high loss of rain water provides a marked contrast with towns situated close to mountains inland. In such areas, runoff discharged from the mountains is partly absorbed within the zone of fringing gravel fans. As a result, ground water supply can be tapped for both settlements and fields.

The hinterland of Siraf (Fig. 54) is dominated by three major river valleys, which occupy approximately 76% of the mapped area. In the remaining 24%, water flows either directly into the sea via small channels or into adjacent river basins beyond the edges of the map. The major rivers – the Rudkhane Kuchek, the Kunarak and the Gharba Rud – flow from the highlands in the north and across the axis of the Namak anticline, often via deep gorges. In the Agha Jari rock series, valley

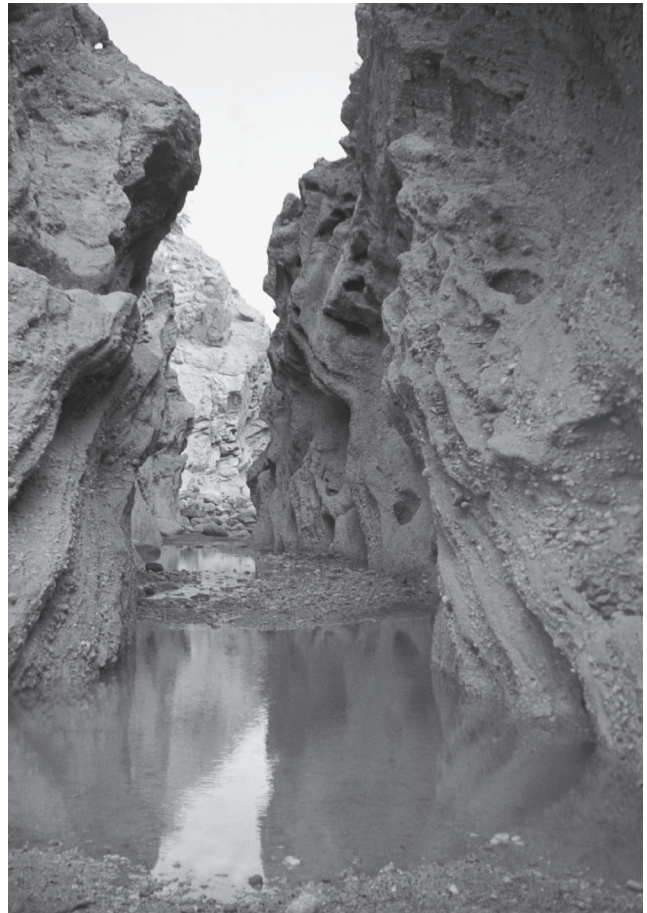


Figure 56. A tang (gorge) eroded through the coastal (Bakhtiari) escarpment along the line of the Rudkhane Kuchak.

cross profiles are more open but again they become narrow and gorge-like where rivers cross the coastal escarpment.

River capture has considerably altered the drainage pattern through time and the numerous terrace levels remaining between 3 and 80 m above the river beds enable stages in the evolution of the Namak anticline and its drainage to be reconstructed. During the Quaternary period the drainage has evolved from a series of parallel streams flowing from the Kuh-i Haft Chah towards a proto-Persian Gulf to the present, more geologically adjusted pattern resulting from numerous river captures. Smaller basins in the Agha Jari marls have suffered several channel diversions as a result of river capture in recent millennia. For example, the present Shilau is a short, dry channel which runs from immediately north of the coastal escarpment via a deep gorge (Tang-i Lir) to the coast in the centre of Siraf. During the heyday of Siraf, its source lay in the head of a valley one kilometre to the north. It flowed to Tang-i Lir across a low gravel terrace dotted with occasional conduits, field walls and buildings. Subsequently, rapid headward erosion by east bank tributaries of the Kunarak captured the upper reaches, leaving only occasional upstanding residuals of the former landscape. This terrace appears to have been eroded back for 700 to 1000 m since abandonment, judging from the position of the remains of Siraf -type buildings located below and to the west of the terrace.

Although raised Quaternary sea levels must have left traces in the form of raised beaches, no examples were recorded during the survey in part because the sandy and pebbly nature of the Bakhtiari formation inhibited their recognition. Raised marine terraces along the Persian Gulf coast result primarily from the combined effect of the tectonic uplift of the Zagros folds and the eustatic lowering of global sea levels as a result of ice sheet formation (Lambeck 1996). Of the large number of raised marine terraces recorded elsewhere along the Persian Gulf coast of Iran, most date from earlier Pleistocene raised sea levels. The most closely dated of these are situated between 9 and 26 m above sea level and date from the last interglacial, between about 139,000 and 104,000 years ago (Reyss et al. 1998: 235). Most relevant to the archaeological phases represented around Siraf is a raised beach or marine cliff line that is traceable some 1.5 to 4.0 m above sea level at Qeshm Island and one or two other localities. This feature suggests that the rising Holocene sea level reached an elevation of between 1.5 and 4.0 m above present-day sea level some 6000 years ago, and then declined somewhat about 4000 years ago (*ibid.*: fig. 11). About 1.0 m of this difference in sea level may be accounted for by the uplift of the Iranian land mass (*ibid.*: 236). Elsewhere,

on the southern side of the Persian Gulf, raised fluvial and marine terraces are found at elevations of 1–3 m above sea level (al-Asfour 1978), but these are difficult to correlate over long distances.

Inland of the mountains, tectonic factors and the lowering of sea level may have been cushioned during the Quaternary because local intermontane plateaux would have acted as local base levels of erosion, so that any changes in land or sea level would not have been immediate but would have affected the area only after an appropriate response time. Nevertheless, as in Iranian Makran, coastal change was probably closely linked to rapid orogenic uplift during the late Pleistocene (Little 1970).

During the last glacial period, the sea withdrew from the entire Persian Gulf to around the Straits of Hormuz and the floor of the Persian Gulf formed a relatively waterless depression with possibly a few swampy tracts (Sarntheim 1972). About 10,000 B.P., the sea was still at 30–35 m below present sea level; but it rose to around modern sea level about 4,000–5,000 B.P. (Larsen and Evans 1978). At Siraf, a relict cliff line cut into the coastal escarpment may represent the maximum height of the post-glacial sea level. It is pre-Siraf in date and may relate to strandlines remaining at around 1.5–2.5 m above sea level in Qatar and dated in the range of 5000–4000 B.P. Due to regional tectonics, however, this correlation should be treated with extreme caution.

Land Use

The intensity and amount of cultivation around Sirāf depended upon four factors:

1. The demands of the city.
2. The potential of the terrain for cultivation.
3. The existence of a suitable water supply.
4. The presence of an efficient communication system.

1. The demands of the city presumably varied with the changing population of Siraf, and there is good evidence to show that the amount of cultivable land decreased through time as a result of badland erosion. Available water, in the form of groundwater and semi-permanent pools in the river beds, was probably more abundant when large areas of well-maintained terraces existed, but it would have decreased as they decayed and run-off became greater. In this section we identify the quantity and type of agricultural land present during the heyday of Siraf and attempt to relate this to the environmental potential, water supply and communications.

2. The soil resources of the region are very limited, and where soils exist they fall into Dewan and Famouri's (1964) category of desert saline and non-saline alluvial soils of limited potential for cultivation. Table I shows the major soil types based upon topographical and geological land units and the past and present potential of these soil types. The main limitations can be summarised as follows:

- (a) Mountains and hill land (classes 1, 2 and 3 on pp. 54 and 57) have steep gradients and they lack cultivable soil.
- (b) Badlands and eroded scarplands (classes 3 and 4) also have steep gradients and lack cultivable soil; gullies dissect flat surfaces.
- (c) Moderately deep loams and sandy loams in the Doband valley and on the coastal plain (classes 4 and 6). Gullying has restricted soil potential in Doband valley (Fig. 57). Accumulations of salts within the soil are most obvious along the coastal plain where groundwater is within 120 cm of the surface and occasional salt flats exist near estuaries. Inland, signs of salinity are less obvious but surface efflorescences of salt do occur near seepages and are likely to have occurred in the past in Doband valley if irrigation raised the water table too close to the surface. In general, however, salinity does not appear to have been a critical limitation of soil potential.
- (d) Terrace soils (mainly in 3 and 4) have coarse textures with numerous large stones. They retain relatively little water, sometimes limit root development and, depending upon their stoniness, they can be difficult to cultivate.

Detailed reconstruction of previous soil covers was not attempted, but it seems probable that soils in areas 1 and 2 have changed relatively little since the heyday of Siraf. Those of area 3 show signs of extensive erosion and today occasional residuals of shallow soil remain, surrounded by bare, sheet-washed rock surfaces and associated with the remains of buildings.

Although no studies of soil chemistry were undertaken, it appeared that most coastal plain and Doband valley soils presented no major limitations to cultivation. On the other hand, it is clear that gullying was present before the city was established. Overall, gullying presented a threat to cultivation, and cultivation cannot be blamed for much of the badland erosion. Further inland, the shallow soils of the river terraces provided numerous cultivable enclaves within two hours of the city, and even in the mountains to the north small enclaves of former cultivation remain.

3. Water supply. Rainfall records for the Persian Gulf

coast are scarce and incomplete; but it appears from the few published sources that Siraf, with an average annual rainfall of 200–300 mm lies close to the lower limit for rain-fed farming today. This limit is said to be approximately 200 mm per annum, but the figure must be increased in the hot desert zone where annual variability of rainfall is high. In general, the average rainfall at Siraf probably fluctuates between 120 and 140 mm per annum, and it is evident from modern practice that although rain-fed cultivation can produce results, the outcome of any one year's cropping is uncertain. Today in the Siraf area, rain-fed cultivated land depends on direct rainfall and perhaps a little runoff from adjacent slopes. During the occupation of Siraf some rain-fed land may have received runoff from slopes, and one of the field systems situated in a blind valley received water from conduits which did not lead down from a spring or a perennial pool. Because of the lack of a specific water source, some of these blind valley systems may have been areas of runoff farming and the presence elsewhere of numerous cisterns suggests that former techniques of water conservation were more elaborate than those current today (Fig. 58; see p. 93).

Of greater importance than the above methods of water supply were open-channel conduits, which supplied water for both cultivation in the hinterland and domestic needs in the city. The conduits collected water from small pools or from gravels in the middle reaches of the valleys in the Mishan or Gachsaran series, or from the base of the Kuh-i Haft Chah (Fig. 59). The water was led along small channels approximately 40 cm wide and 25 cm deep, which maintain progressively higher levels relative to the descending dry river beds. They made irrigation of higher gravel terraces possible and at the same time provided a build-up of hydraulic "head" downslope, which enabled water mills to be installed at appropriate locations. Although it is a wise engineering practice to make certain that channel gradients remain relatively gentle in order to minimise erosion of the conduit bed, at Siraf it was obvious from the very fragmentary remains of the channels that longitudinal erosion by conducted water was less important in the destruction of channels than their wholesale lateral removal by the actively eroding river channels. Consequently, during the survey it was crucial to carefully investigate great lengths of valleys in order to determine the locations and overall extent of the Sasanian and early Islamic conduits.

All conduits varied in their construction depending upon the topography and the type of bedrock (Fig. 29). In open terrain the channels were U-shaped, being made of rounded cobbles, 10–30 cm in diameter, set in

<i>Topographic Region</i>	<i>Present Soil Potential</i>	<i>Soil Potential in 9th/10th cent. A.D.</i>	<i>Present land use</i>	<i>Land use in 9th /10th century</i>
1) Gachsaran Formation	High, bare rock surfaces with some thin soils. Land use potential: low or very low.	Probably as today	Range land for goats	Probably as today
2) Kuh-i-Haf Chah	High, bare rock surfaces with pockets of thin soils & deeper calcareous soils in occasional solution hollows. Land use potential low; moderate in hollows.	As today, but down slope movement of soils on some slopes favoured the construction of soil-retaining terraces.	Range land for goats. Very rare patches of dry farming.	Range land for goats & terraced dry farming.
3) Mishan scarplands	Mainly bare rock surfaces with some pockets of thin soils. Gully erosion is limited to marls. Occasionally there is a sequence of: bare rock / loose rock debris / thin loam soil. Land use potential is low, but moderate in some valley heads.	The examination of residual soil around some building mounds suggests there has been considerable soil erosion in the past. There was probably a deeper soil and higher vegetation cover during the 9th /10 th centuries A.D. Land use potential must have been slightly higher than today; moderate potential in some valley heads.	Range land for goats with rare patches of dry farming.	Dry farming in some valley heads and some irrigation on lower terraces.
4) Agha Jari Formation A)	Highly dissected scarplands with low, much dissected terraces, numerous steep, bare slopes. Upper reaches of some valleys blocked by falls of gypsum rock. Land use potential very low.	Dissected scarplands with occasional gravel caps. Probably heavily eroded in 9th /10th centuries although some low terraces are associated with remnants of stable valley heads. This suggests there was a phase of stable valleys at some time during the earlier Holocene. Land use potential probably very low, higher on some terraces.	Range land for goats	Range land for goats with possibly a little cultivation on some low terraces.
Agha Jari Formation B)	Highly dissected intermediate level terraces. Land use potential very low.	Judging by built structures, field walls and related agricultural features, this formed a virtually continuous surface during the 9th/10th centuries. Gullying would have presented a continuous threat. Land use potential moderate.	Range land for goats	Much irrigated land and dry farmed cultivation.
4) Agha Jari Formation C)	Flood plain terrace of Kunarak River. Dissected by small gullies in places and receiving sediments washed from slopes in other places. Considerable area of loam soils > 40cm deep. Land use potential: moderate.	Land use potential as today but less gullying. Close to city and irrigation water. Level land with soil cover has similar potential to the present day. Land use potential moderate.	Range land for goats. Some dry farming and one irrigated enclave.	Extensive irrigated and manured land
5) Bakhtiari Formation A)	Mainly bare conglomerate surfaces with occasional pockets of loam. Deep gorges impede communication along length of escarpment.	Potential as today; very few signs of past cultivation except for small areas to west of the Gharba Rud.	Range land for goats	Buildings, cemeteries, quarries, water catchment areas for streams.
Bakhtiari Formation B)	Late Bakhtiari Formation. Land use potential generally low, but locally rises to moderate in basins eroded into the Late Bakhtiari Formation.	Land use potential as today and in certain basins towards Akhtar in the west rises to moderate.	Range land for goats with some sporadic dry farming towards the west	Some cultivation in natural basins towards the west.
6) Coastal Plain A)	Fan gravels. Usually low potential, but where these possess a loam matrix, the potential rises to moderate.	Similar to today.	Usually not used.	Due to pressure on land there is some cultivation where loams are present.
Coastal plain B)	Sandy and loamy coastal plain. Possesses a relatively shallow but brackish water table which remains at roughly sea level. Salt content can be controlled by irrigation and leaching. There is some gully erosion near river deltas, e.g. at mouth of Gharba Rud. Land use potential moderate or higher.	As today, moderate land use potential.	Main area of irrigated gardens, palm groves and dry farming.	Mainly irrigated land, but some extra-mural settlement.

Table 1. Soil resources of the Siraf area.



Figure 57. View of the Doband Valley from the coastal escarpment looking towards the interior mountains. Note that Early Islamic relict fields occur in patches in the lowlands to the right of the river bed, and also in patches within the eroded badlands.

sārūj (Figs 60b and 61). Apparently, like the modern cement equivalents, the conduits were open to the sky. Along steep hillsides and on some vertical rock faces the channel was partly carved out of the rock but the outer half was usually of masonry as described above for conventional open channels (Fig. 60c). Finally, along gorges such as those through the coastal escarpment, the U-shaped open channel was first cut in the bedrock (Fig. 60d) and then, in the most precipitous reaches, the channel was tunneled through the rock, with occasional vertical rectangular access shafts or long horizontal “windows” (Figs 60e and 61). In locations away from gorges, channels appear to have been led through the coastal escarpment by means of qanats. Such a tunnel must have existed in the Doband valley, where it appears that a water channel in a dry valley head originally took its water from well up the Rudkhane Kuchek. Only one or two channel fragments remain along this very eroded section of the valley, but they do in fact lead down from one of the few good perennial pools in the hinterland. The presence of water mills along such a channel is further evidence that this conduit conducted water year-round, because it would have been pointless to build watermills along a channel

supplied from a dry, blind valley and which would have flowed episodically, perhaps once or twice a year.

Conduits negotiated tributary valleys by bridges, such as an arched bridge along the Gharba Rud system or a bridge with two central piers found along the Kunarak valley. Simply leading the conduit via a deep meander up the tributary valley also sufficed and it enabled the conduit to be led up the tributary valley and down the other bank, as illustrated in Fig. 60f. If such channels were cut into bedrock, their erosion was relatively slow and one small channel within the Kunarak system has only suffered 5 cm of erosion since it was built, presumably about the ninth or tenth century.

The negotiation of major rivers required the construction of either large bridges or inverted siphons (Fig. 59: I.S.). Originally, the siphon at I.S. probably consisted of two towers, but today only the downstream tower with an internal diameter of 70 cm remains (Fig. 60g). Presumably, in this feature, water passed along the inlet channel situated some 2 m above the dry river bed and flowed down an upstream vertical tower to be led via a sealed horizontal channel below, or through, the gravels of the river bed. It would then have risen

up the downstream tower to a height of only 70–80 cm above the bed to flow down to the coast. For this siphon to function successfully, the entire U-shaped pipe must have been filled with liquid in the manner of a conventional water siphon.

Conduits were employed both for domestic purposes and the irrigation of fields. In fact, the former existence of irrigation was usually inferred from the presence of mortared channels, which branched off the main conduit towards long-deserted fields. More direct evidence was found on the coastal plain east of Siraf, where a channel distributory system was found within fields and also where one or two channels appeared to be trending at right angles to the main conduits.

In at least three places, masonry dams were constructed to divert flood waters into conduits (D on Fig. 59; Fig. 62). Such dams were situated where no permanent pools were available to provide water. Water loss by evaporation would have been very great from behind the dam, and it is likely that water was only stored for part of the year. In other words, the dams were detention or diversion dams, intended for temporary storage only.

Two sections of a large dam in the Rudkhane Kuchek (D to north, Fig. 59) exhibited a construction technique typical of other water supply structures, with parallel courses of trimmed limestone blocks set in a thick matrix of *sārūj*. A semicircular buttress, 1.6 m in diameter, formed part of the downstream face and provided additional strength against the high pressure of flood waters. The overall dimensions of the surviving portions were 11.1 m (length) and 3.5 m (height), while the basal width of 1.85 m narrowed slightly upward, giving the impression that the dam had been constructed with a slight batter. These two remaining dam fragments occurred some 50 m downstream of a narrow bedrock constriction in the river bed and it appears that the dam had originally stood at the constriction (an ideal dam site), but subsequently had burst and been carried downstream and dumped upright in its present position. The dam presumably provided water for a small settlement downstream on the right bank of the Rudkhane Kuchek.

A second, smaller dam was found to the west of Siraf along a valley draining the dip slope of the coastal escarpment (D to west, Fig. 59). Some 4 m of poorly stratified silts, sands and gravels had accumulated behind the dam, which had evidently been used until the storage space behind had become filled with silt. Subsequently, the dam was breached and partly destroyed. During its period of use, the water appears to have been led via two conduits towards a small group of fields along the coast to the south east.

All told, some nine or ten conduits appear to have



Figure 58. One of the many water tanks or cisterns found in the hinterland. Note the partially caved in vaulted roof.

reached the coastal plain in the early Islamic period (Fig. 59). These were not built simply to supply domestic water for the coastal settlements; indeed, it is likely that irrigation claimed the lion's share of water, with only the residue reaching the inhabitants of the city. This conclusion is supported by the following calculations. If it is assumed that five channels reached the city – two via the Kunarak, one via Tang-i Lir and two via the Rudkhane Kuchek – the estimated total of 27,276,000 litres/24 hours would provide 100,000 people with 273 litres per person/day. Clearly however, despite the fact that the population of Siraf is unknown, these figures (both the number of inhabitants and their consumption of water) are excessive. A significant surplus, therefore, was available for irrigating fields and gardens.

An additional use of the channelled water supply was to provide power for grinding cereals. Mills took the form of towers constructed at specific locations

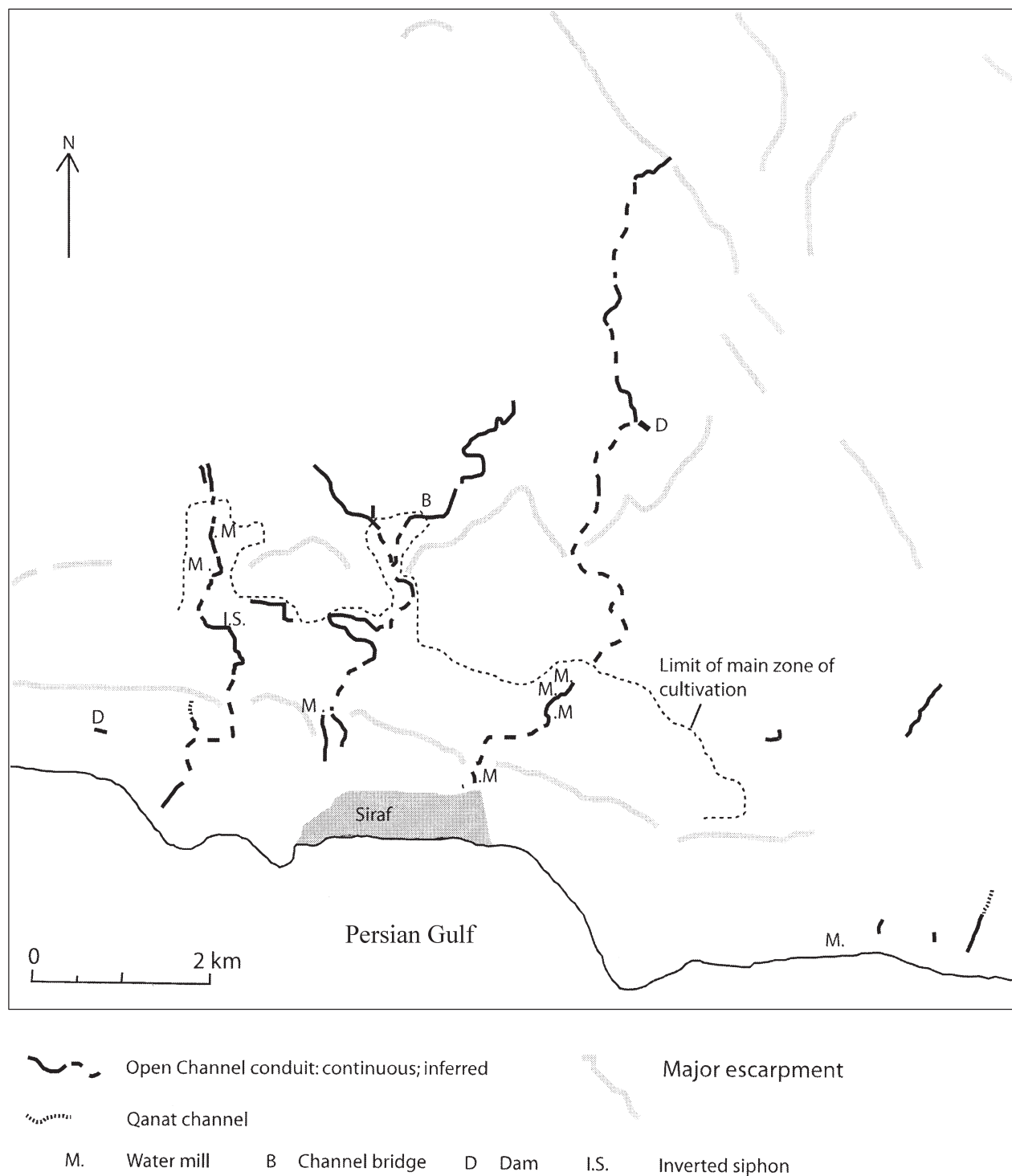


Figure 59. Some of the water supply channels and related features that were mapped. Conduit alignments have been reconstructed from often widely separated exposures of short lengths of intact channel. It is assumed that missing sections have been removed by the actively eroding rivers.

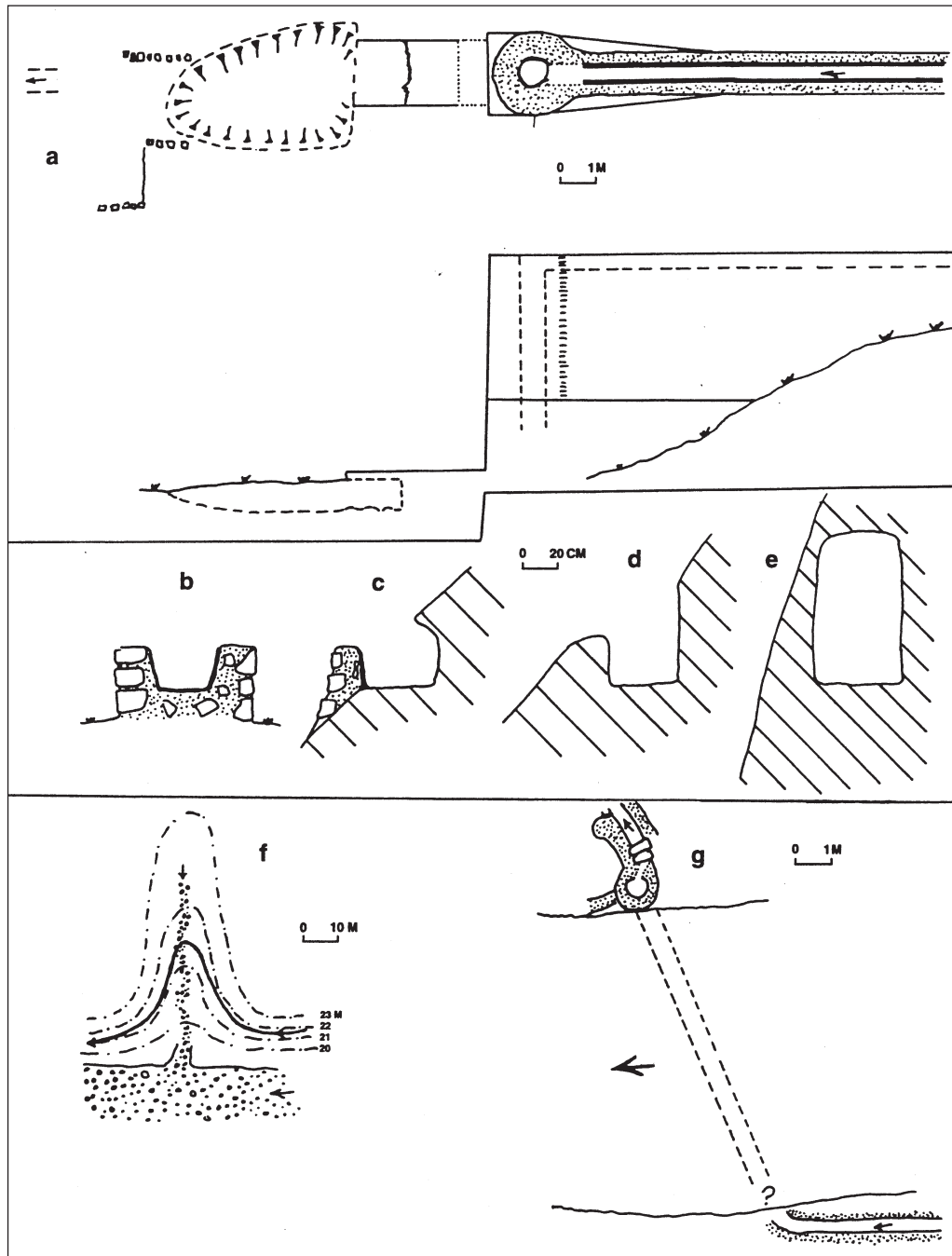


Figure 60. Details of a water mill (a), and conduits (b-e), showing how side valleys (f) and a major river were negotiated; g) represents an inverted siphon under the Gharba Rud, downstream penstock to top.

along the open conduits. Usually, the conduit had been led at a gentle gradient along the valley side until it reached a height of 6–10 m above a flatter area of valley floor. At this point the channel was built out along the top of a high masonry wall at the end of which the tower was constructed (Fig. 60a). The tower (or mill penstock)

was pierced by a circular, roughly vertical pipe, which measured between 70 and 107 cm in diameter (Fig. 63). The height of the tower was at least 7 m and at its base a small square or rectangular room remained slightly below ground level. Usually, there was no evidence of a roof, but at a mill near Akhtar this consisted of a



Figure 61. Line of early Islamic conduit snaking along the face of a gorge through the coastal escarpment. Note that this is type c of Figure 61.

vault with a pointed cross section. From the base of this room, the open channel continued downstream, at an elevation of 6–10 m below the top of the tower. The construction technique was the same as for the dam described above. Eight millstones, presumably salvaged from one of these mills, were used to pave part of the fifteenth- or sixteenth-century building at Site E (see p. 20). The millstones varied in diameter from 0.8 to 1.0 m and were made of gritty sandstone (these are illustrated in Whitehouse 1969, pl. IVc).

When the mills were in use, water flowed along the inlet channel and filled the vertical pipe in the mill penstock. It then issued from an opening at the base of the tower and a jet of water was directed against a turbine wheel set on a vertical axle (see Wulff 1966: 280–82; Costa and Wilkinson 1987). The force of the jet derived from pressure formed by the vertical column of water rather than the force of falling water. Mills of this type, which are sometimes known as “arubah penstocks”, have a wide distribution in the Near East, from Greece to the Persian Gulf, where water supplies are both small and variable (Avitsur 1960; Costa and Wilkinson 1987). The penstock tower mill is especially effective along open channels where flow is both small

and variable. In the Sirafi examples, a pair of millstones would have been set on the vertical axes above the turbine wheel and grain was fed into the millstones from a hopper. Sometimes a circular cistern was located a little way upstream of the inlet and this presumably acted as a regulator to supply a steady discharge of water to the mill. When the mill was not in use, water could be led round a diversion channel and back into the conduit downstream of the mill chamber.

Conduit gradients, being much gentler than the river valleys, permitted drops of up to 15 m (vertical) in every 500 m (horizontal) to be incorporated into conduits for the construction of mills. The mills were the only evidence for the production of flour and the source of the cereals is uncertain. It is reasonable to assume that mills located in the hinterland were processing locally grown cereals, but those located near the coast may also have processed cereals imported by boat.

Altogether eight abandoned watermills were found in the area of Fig. 59, two more were found to the north west, near Akhtar, and a further six inland, near Jam and Galehdar (see Chapter 5, pp. 85–86). It is possible that others existed along the Kunarak and Rudkhane Kuchek rivers, but have been destroyed



Figure 62. Masonry dam in the area of Kuh-i Padri.

by fluvial erosion. Without excavation the mills were difficult to date, but most seem to have been built along the early Islamic water supply channels and are, therefore, probably contemporary with Siraf's main period of occupation. Similar water mills in Oman were constructed underground to allow for the flatter terrain and these have been dated by excavation to the ninth and tenth centuries A.D. Similarly, Neeley (1974) attributed comparable mills on the Deh Luran plain in Fars to the Sasanian or early Islamic periods.

For reasons made clear on p. 58, groundwater recharge was probably higher in the ninth and tenth centuries than it is today, but the quantity of groundwater present in river gravels and beneath the coastal plain would have been much less than in the interior of Iran, where abundant groundwater remains in gravel fans at the foot of the mountains, or in wide gravel-filled river valleys (Beaumont 1968). In the Siraf region today, most water is pumped from shallow wells along the coastal plain although a few ox-powered wells were still in use in 1973. During the occupation of Siraf numerous wells were cut through the Bakhtiari sandstone but these probably only supplied a limited quantity of water for domestic purposes, and perhaps limited areas of garden.

Only one true *qanāt* was found. This was located some kilometres east of the city, in the only area where gravel fans spread directly from Kuh-i Haft Chah to the coast (Fig. 59). The surface features were typical of *qanāts* recorded elsewhere: namely, circular mounds of upcast, some 8 m in diameter, surround one metre-diameter stone-lined access shafts, which

punctuate the plain in a straight line at intervals of about 20 m. The underground conduit, emerging at the surface some 600 m from the coast, was led into a 22 m diameter circular cistern and then must have been plunged below ground again for the only trace of a conduit was one more circular access shaft along the line of the *qanāt*. After a short interval, the channel once again emerged on the surface to flow through the coastal fields and settlements. It is possible that a water mill, similar in design to the other penstocks but constructed wholly underground, stood immediately downstream of the cistern (cf. Wulff 1966: 282; Costa and Wilkinson 1987).

The *qanāt* had been dug in the only terrain near Siraf suitable for such construction and, significantly, around Jam, where conditions were again suitable for *qanāt* construction, they are the dominant type of water supply. This suggests that wherever ground conditions permit, the *qanāt* was employed as a water collection device. Despite the difficulty of cleaning and maintaining *qanāts*, they are ideal for collecting reliable flows from groundwater and keeping it in a cool, shaded place and ideally, in an arid environment, surface water conduits, which are subject to relatively high evaporation rates, need only be used as a supplementary water source.

In general, in an arid environment, it is better to have a diverse range of water sources so that if one dries up there are alternative means of supply, and it is significant that the town of Sohar in Oman obtained water from surface channels, numerous *qanāts* and thousands of deep and shallow wells located within



Figure 63. Penstock of water mill to the NW of Siraf. The figure (D. Whitcomb) is standing over the hollow of the milling chamber. The embanked inlet channel is in the left foreground.

both fields and settled areas. This “belt and braces” approach was especially pertinent at Siraf because, not only was the city’s water supply limited and of poor quality, but also it was necessary to maximise the use of cisterns in order to exploit both direct rainfall and local runoff. Most seriously of all, the water supply was vulnerable to short-term environmental fluctuations, which might cause supply pools to dry up, or to erosion by flooding, which could destroy segments of channel and human severance of water supply lines during times of conflict.

Communications

Communications with the hinterland were poor but manageable through valleys in the Mishan, Agha Jari and Bakhtiari formations. But beyond them, in the area of the Gachsaran formation and in the Kuh-i Haft Chah, traditional routes climb above the valleys onto the escarpments and ridges. In several places on the Kunarak route to Jam, short sections of paved path were encountered (see pp. 79 and 81). As is the case today, during the heyday of Siraf there were probably two major routes inland to Jam (Fig. 64), both of which had to negotiate the almost precipitous routes up Kuh-i Haft Chah, which certainly made transport by pack animal difficult. These routes were much

slower than routes across low-gradient terrain and it is apparent from Fig. 65 that, for a given distance measured radially from the city, actual travel times are longer than expected, owing to the steepness of the route (some of the tracks had a gradient of about 30°), the sinuous nature of the route, and the “frictional resistance” of the surface due to the presence of gullies, large boulders and loose stones.

The inland routes suffered from all three impediments, whereas travel along the coast was relatively swift. Consequently, the isopleths for travel time tend to be flattened rather than circular, a point that is emphasised further if “lag isopleths” are constructed to show the difference between expected travel time (across a horizontal surface) and the actual travel time measured by the author’s pacing. For example, for certain points at forty minutes’ walk from the city gates, twenty minutes had been absorbed combatting the various impediments detailed above. The generalisations depicted on Fig. 64 do not, of course, give an impression of detailed travel times but they successfully demonstrate that the so-called “frictional effect” of overland transport is a critical factor in movement in areas such as the hinterland of Siraf.

The Distribution of Cultivated Land

The primary task of the survey was to map all areas of former cultivation and settlement within the hinterland of Siraf as shown on maps at a scale of 1:25,000 (the largest scale available). The exercise entailed mapping three classes of phenomena:

1. Field patterns and areas of former occupation distinguished by soil-retaining or enclosure walls of both dry and mortared stone, and the remains of houses, conduits, cisterns and miscellaneous structures. Sherd scatters were also noted according to their context: within field areas, strewn across the terrain in general, or associated with the remains of buildings. Piles of rubble, most of which appeared to represent collapsed buildings, were included to give an overall picture of the intensity and extent of human activity.
2. Formerly cultivated land deduced from indirect evidence such as sparse scatters of sherds and fragments of water distribution channels. On the coastal plain and in Doband valley, traces of Sirafi occupation were frequently obscured by modern agriculture and by sediments washed from adjacent higher land. In these areas, criteria for mapping Sirafi cultivation were expanded to include non-urban lands of relatively high agricultural potential exhibiting some of the features of class 1. These class 2 areas frequently possessed an extensive surface scatter of ninth- to eleventh-century artefacts. By analogy with traditional agricultural practice, these scatters are inferred to be the result of fertilising the land with settlement-derived refuse (see p. 73), probably deposited by manuring. Class 2 is the most popular land for cultivation today and the present enclaves probably represent islands remaining from a former continuous spread.
3. Eroded lands in the Agha Jari formation. These are mainly of class 2 and they have undergone considerable gullying since abandonment. This has dissected terraces from 5 to 15 m above the river beds and has caused the isolation of cisterns, buildings and some field walls. In addition, low density sherd scatters and small piles of roughly dressed stone are common on the remaining fragments of terraced land, which are often less than 100 m².

These three classes are taken to represent the maximum extent of land cultivated during the Sirafi period. This grouping is based on the assumption that the maximum measurable extent of cultivation was contemporary with the period of maximum urban population. This assumption is considered to be

realistic, because archaeological investigations have shown that a major city existed at Siraf for only a relatively short period and from the fact that, during field work, all sherds associated with the above land classes appeared to date from the period of Siraf's heyday. In addition to the map of former cultivation, a map of present-day cultivation is included (Fig. 64). This allows the medieval cultivation to be compared with that of the twentieth century, and the decline over the last 1,000 years to be calculated.

Field mapping was at a scale of 1:25,000 using manually enlarged 1:50,000 planimetric maps. Circumstances did not permit a rigorous instrumental survey, and the maps presented here are of reconnaissance surveys in which the positions of features were established in relation to river junctions, meanders and major topographic features shown on the original planimetric maps. Details were paced in the field. Field checks made on the planimetric map showed only minor errors, most of which could be corrected, while errors from pacing and mapping of built structures are probably correct to 25 m or 1 mm on the map. Such errors were encountered because of the difficult nature of the terrain and consequently absolute positions are not altogether reliable. The main object was to fix the approximate positions of the relevant features, thus enabling the areas and patterns of past and present cultivation to be seen.

The estimated total area of cultivated land mapped for the Sirafi period was 691 ha. Of this, 197 were Class 1, 395 were Class 2 and 99 were Class 3. Using the three mapping classes, information on travel time from the city, topography and the distribution of fields, two major regions each containing two subregions were identified. These were as follows:

- A(i) The coastal plain and A(ii) the plain and low terrace in Doband valley. Both subregions lie within the ten-minute lag isopleth and most of their area lies within fifty minutes' walk of the city. As this area not only possessed the deepest and most fertile soils but was also the area immediately surrounding the city, it was probably the main area of crop production close to Siraf.
- B. Outlying enclaves in the river valleys and highlands. These were found in the less accessible areas of the hinterland over thirty minutes from the city, where time lags were greater than ten minutes.
- B(i) The major valleys and tributaries. The fields were usually restricted to river terraces at all elevations as well as stable valley heads of tributary valleys in the Mishan and Agha Jari scarplands. Nearly all of the land mapped was of class 1 and mainly consisted of fields with soil-retaining or enclosure walls;

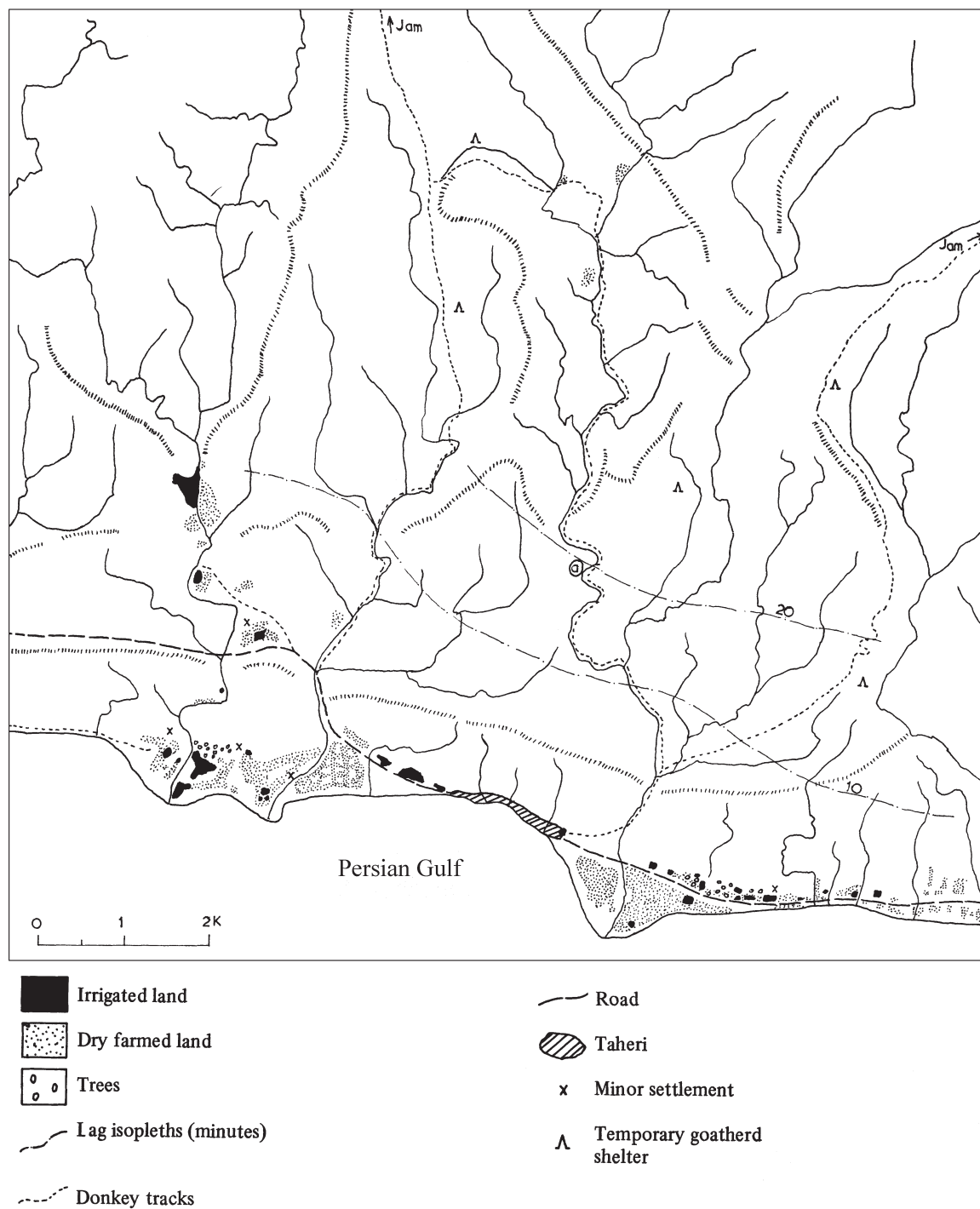


Figure 64. Land-use during the late 20th century A.D.

buildings and sherd scatters were rare. Today, the soils of these enclaves are shallow, stony loams, less than 40 cm deep and inferior to those of area A.

B(ii) The Kuh-i Haft Chah foothills (Fig. 53). These are more than ninety minutes' walk from the city

and are the least accessible fields mapped. Most fields were behind soil-retaining walls, up to 1 m in height, which formed narrow terraces on slopes steeper than 10°. Relative to the cost of construction, the area of land formed was quite small and this



- | | | |
|----------|--|------------------------|
| | Class I, Agricultural land maximum extent. | } see text. |
| | Class II, " " " " | |
| | Class III, " " " " | |
| | Siraf main city (Dense occupation) | |
| | Siraf east city. | |
| C | Cemetery | |
| | City walls | |
| | Travel time isopleths, 10 minutes. | M Manured land. |
| | Travel time isopleths, 20 minutes | Minor Settlement |

Figure 65. Land-use of the early Islamic period.

appears to represent an unusually high investment in such a remote area. These fields were apparently unirrigated except possibly by storm runoff. Their remoteness from Siraf suggests that they were farmed from nearby buildings, which might also have served as summer retreats for residents of Siraf.

Because irrigation gives far greater crop returns than rain-fed cultivation, an estimate was made of the proportion of mapped land devoted to each type of farming. These types were distinguished by their relative proximity or remoteness from obvious conduits. This enabled the following classes to be established:

1. Probably irrigated: fields associated with conduits or near, and at the same elevation as, conduits.
2. Possibly irrigated: fields at higher elevations, relatively close to conduits and to which water could have been conveyed without great difficulty.
3. No evidence for or against irrigation.
4. Possibly rain-fed: fields on higher terraces or within valley heads at some distance from pre-existing water supplies.
5. Probably rain-fed: fields on the highest terraces and in high inland valleys (e.g. on Kuh-i Haft Chah) and at a considerable distance from water supplies.

Using these categories, the percentage of irrigated land was estimated in the following ways: (1) by counting the total number of enclaves and estimating the percentage of this number devoted to each category; (2) by calculating the irrigated area in each category as a percentage of the total area of cultivated land (691 ha). The second method is probably more accurate than the first.

Table 2 shows that irrigated enclaves were both more common and covered a greater area than rain-fed land. Allowance must be made for fallow, which may have taken up a portion of both rain-fed and irrigated land; furthermore, it is possible that not all of each enclave was devoted to the same type of land use; some may have been irrigated along riverside conduits while slightly higher land nearby was rain-fed. In general, however, it is the larger enclaves which are most likely

to cause the largest errors in calculations and it is these that form the bulk of irrigated areas today. By analogy, it is likely that these areas were also irrigated in the past.

In addition, some of the apparently rain-fed land may have received supplementary water as a result of harvesting flood water or slope runoff. Such systems can vary from sophisticated systems with diversion dams or silt-trapping dams, to small systems utilising local slope runoff. The only likely examples of flood irrigation agriculture noted are the three dams described above. Nevertheless, their associated fields represent only a small portion of the total field area. Small areas, which may have supplemented their soil moisture by means of slope runoff have, for convenience, been included in the rain-fed areas.

Another method of securing greater yields was by manuring. This involved hauling animal droppings, organic domestic refuse and perhaps human excreta from the main settlement to the outlying fields, a procedure well documented by English (1967) in the vicinity of Kirman. Other studies have shown that manuring is limited to the land within 3 km, or one hour's walking time, of the settlement (e.g. Mulle-Wille in Chisholm 1962). As a result of this process of applying fertiliser, a zone of intensive farming, in this case irrigated, develops round the main settlements. At Siraf, the existence of such a zone is attested by the sometimes dense scatter of shells, potsherds and glass found scattered across fields in the hinterland and along the coast (Fig. 65). Such scatters represent the undecayed remnants of manure gathered from the streets, refuse dumps and latrines of Siraf. Presumably this was carried to the fields by pannier-laden donkeys for it is known that at this time there was a brisk trade in commercial manure (cf. the situation at Fustat, described by Scanlon 1970). It can be seen from Fig. 65 that the distribution of relatively dense field scatters of sherds is limited to within forty minutes of the city; beyond this scatters were sparse and discontinuous, either because manure was not applied or because it came from local byres and not from artefact-rich urban areas. In the 1970s, a similar scatter of artefacts formed a dense scatter around the town of Sohar and, although field walls are missing there because of the nature of the terrain, it appears that up to 4,800 ha

	<i>Class 1</i>	<i>Class 2</i>	<i>Class 3</i>	<i>Class 4</i>	<i>Class 5</i>
% of field enclaves	40	16	7	13	23
% of total cultivated area	69	17	3	3	8

Table 2. Percentage of irrigated land according to class.



Figure 66. Aerial view of part of Siraf with modern cultivation plots.

were shown to have been manured and irrigated in the early Islamic period (Wilkinson 1975; 1982; Costa and Wilkinson 1987). Sohar's massive tract of agricultural land again emphasises the limited area of fields and gardens in the vicinity of Siraf.

The Extent of Cultivation in 1973

Six classes of agricultural land were mapped in 1972–73 (Fig. 64). These are:

1. Irrigated and enclosed land.
2. Irrigated and unenclosed land.
3. Palm gardens.
4. Present-day rain-fed cultivation.
5. Sporadic rain-fed land with evidence of cultivation in recent years.
6. Range land mainly for goats.

To facilitate comparison with the maps of former cultivation, classes 1, 2 and 3 have been combined

into irrigated land and 4 and 5 into unirrigated land. These two classes occupied 42 and 127 ha respectively, demonstrating that, today, irrigation accounts for merely one-third of the cultivated land. This land is mainly on the coastal plain but a strip extends northwards up the Gharba Rud valley (Fig. 64). In 1973, depressions among the mounds of rubble on the site of Siraf were used for rain-fed cultivation and minor enclaves also occur inland up the valleys of the Kunarak and the Rudkhane Kuchek (Fig. 66); these appear to be cultivated either by local inhabitants or by occasional itinerant visitors.

More irrigated land occurred beyond the 1:25,000 map in the Gharba Rud headwaters near the village of Hermi (see p. 81), and still further inland on the upland plain of Jam a much larger proportion of the available land appears to be cultivated and irrigated by *qanāts* (see p. 85). In the valleys of Kuh-i Haft Chah, near Jam, terraced fields were irrigated by open channels, and on the north-facing slopes of these hills deserted terraces occurred intermittently from valley bottoms to the

mountain crests. This contrast between the relatively healthy agriculture of the isolated inland area and the total neglect of the coastal belt demonstrates that, although alternative work (such as migrant labour in Bahrain and Qatar) has recently led to a drift from the land along the coast, an irreversible deterioration in the agricultural potential has taken place in the hinterland of Siraf.

Changes in the Pattern of Cultivation

The heavily eroded lands behind Siraf contrast sharply with the less eroded lands of Kuh-i Haft Chah and the plain of Jam. This intense erosion is the product of two factors. First, the marls and gypsums of the Agha Jari formation are very vulnerable to erosion and, once started, headwater erosion may cause gullies to extend rapidly up to several metres in a few years. Secondly, the rapid uplift of the region resulted in numerous terraces, which themselves are vulnerable to erosion by virtue of their height above the level of the rivers. These factors distinguish the coastal belt from Jam and the Kuh-i Haft-Chah region, and the distinction is emphasised by the lack of vegetation, which fails to develop on the ever-changing surfaces of the badlands. This means that the ground surface is less protected from storms and is, therefore, even more vulnerable to erosion. Other potential contributors to gullying, such as winter storms and goat herding, appear to vary only slightly over the area in question. However, at present, goats are allowed to roam freely over the entire area and numerous studies have shown that in regions of vulnerable rock and a semi-arid climate unrestricted grazing can increase both runoff and sediment yield from the ground surface (Lusby et al. 1971; Pereira 1973). However, this probably did not initiate gully erosion around Siraf because, even in the Agha Jari formation, gullying appears to predate the appearance of agriculture by a considerable period of time. On the other hand, it most likely exacerbates the situation by preventing the recolonisation of a protective shrub cover in areas of acute erosion. The presence of Sirafi cultivation inland of the coastal escarpment may have protected some areas from erosion, first by excluding goats from the cultivated land and secondly by protecting the land by the construction of field terraces. On the other hand, cultivation, by concentrating grazing on the surrounding uncultivated land, would have increased gullying, which in time would have threatened the fields. Gullying, therefore, appears to have resulted from a combination of geology and topography, and when these occurred in a specific climate gullying was

likely to result. The rate and intensity of this process is at least partly dependent upon human factors, most notably the control of grazing.

Discussion

It is evident that in the Siraf region severe natural restrictions existed upon water supply and cultivable land. Fig. 67 shows the decrease in area of cultivation from the city in terms of travel time in minutes; 78% occurs within the zone of intensive cultivation located up to 40 minutes' walk from the city and 95% occurs within one hour's walk. This contrasts with what could be expected around an ideal central city located on a plain in which the entire labour force, agricultural inputs and markets were concentrated. In such a case, it is apparent from simple geometry that the area of available land within each ring would increase away from the city. On the other hand, the intensity of cropping would usually be expected to decrease away from the city so that a belt of irrigated, manured and sometimes multicropped land would develop around the city. Farther from the city, labour inputs would be expected to decrease and the amount of fallow land would probably increase. At Siraf, this decrease in the area of cultivation away from the city is merely a

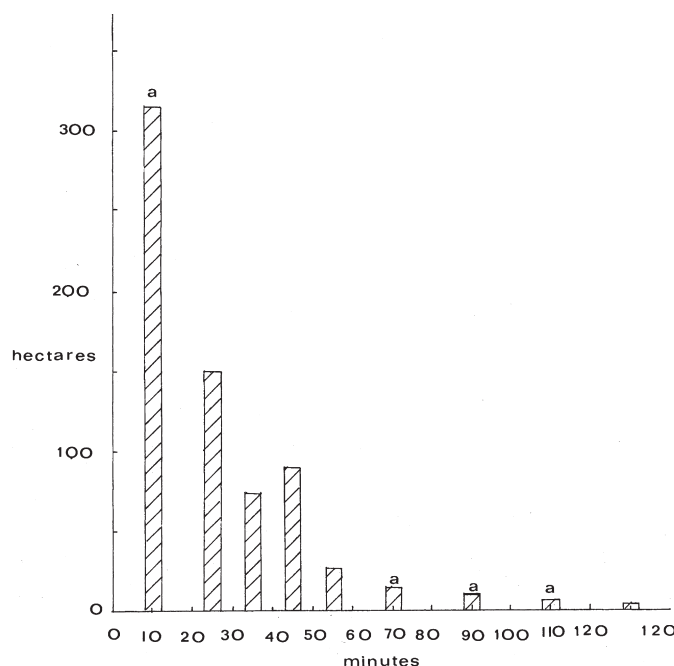


Figure 67. Change in cultivated area with distance from the city gates of Siraf.

result of the local topography, which offers relatively few areas of cultivable land beyond about one hour's walk from the city. The one measurable component of intensive cultivation – the application of urban manure – does conform approximately to the expected pattern to produce a compact inner zone. The weight of this economic argument is somewhat lessened, however, because this is also the zone of deepest and apparently most fertile soils. Other factors, such as labour inputs, are more difficult to measure, but it is likely that many cultivators lived outside of the city within a short distance of their work.

One result of the survey of land-use is that it enables us to estimate both the cultivable area and the approximate supply of irrigation water, and from these to infer – very roughly – the size of the urban population.

From the mapped area of 691 ha of cultivated land, an estimated 630 ha is thought to have been in use in the ninth and tenth centuries. The water supply consisted of at most ten channels, each with an approximate discharge of 60 litres/second, thus providing the city and its fields with a potential water supply of 600 litres/second. Comparison with equivalent traditional communities elsewhere in the Middle East indicates that most of the water would have been used for irrigation (Wilkinson, J. C. 1977: ch. 4). If it is assumed that some 4,600 mm of irrigation per hectare is required for date palms and 2,000–3,000 mm per hectare for annual crops, a conduit with a discharge of 60 litres/second (i.e., 0.06 m³/second) would be sufficient to irrigate approximately 41 ha of dates or 63 to 95 ha of annual crops, including wheat. The total area cultivable with water from conduits, therefore, was between 410 and 950 ha. These calculations of the irrigable area are in reasonable agreement with the observations made during the survey, given the many approximations involved. In order to calculate the total area supplying food to Siraf, a small area should be allowed for well-irrigated land, bearing in mind the limited potential for digging wells and the above-mentioned 60 ha for dryland or runoff agriculture.

The total of 630 ha of irrigated land at Siraf may be compared with the slightly smaller area of 585 ha at the village of Jupar near Kirman, which had a population of about 4,000 living in an area of about 100 ha (Beckett and Gordon 1966: 485–86). It seems unhelpful, however, to compare Jupar with early Islamic Siraf, partly because Jupar is located beyond the northern limit of date palm cultivation and partly because recent studies have shown that rural communities in Iran have significantly lower population densities for their built-up areas (Adams 1981: 350).

Perhaps a more meaningful comparison is with *qanāt*- and open-channel irrigated date palm and annually-cropped gardens elsewhere in the Persian Gulf region. For example, in Oman, where a great deal of comparative information has become available in recent years, "a reasonably sized *qanat* settlement has a population of about 1,000 souls" (Wilkinson, J. C. 1977: 92). This figure is based on a date palm density of about 200 trees per ha and the observation that forty to fifty trees will support a family of about five persons. In other words, twenty to twenty-five people would be supported by each hectare of palm garden, with a small additional area for annual cropping. Alternatively, if the land was used exclusively for wheat, irrigated yields of 1,000–2,000 kg/ha could support populations of between four and eight per cultivated hectare. Using these approximate figures, the mapped total of 630 irrigated hectares at Siraf would support a population of approximately 12,600 to 15,750 based on date cultivation and significantly less – 2,500 to 5,000 – if wheat farming predominated. The additional rain-fed area of some 60 ha would help to support only a slightly increased population.

Because of the problems inherent in estimating urban populations on the basis of the size of the city, it is difficult to arrive at a meaningful estimate of the population of Siraf. Nevertheless, if Adams's mean population of 125 persons/ha for urban areas is employed, Siraf (with a total area of about 129 ha) would have had a population of approximately 16,000 (Adams 1981: 349–50). Because the populations of traditional Middle Eastern cities vary from as little as 55/ha to as much as 538/ha (giving a median of about 180 and a mean of 220), it seems likely that Siraf had a population in excess of 16,000 and possibly 23,000–28,000 or even higher. It follows that, although an approximate equilibrium between the needs of the population and the yields of its hinterland may have existed, it is much more likely that the fields and gardens of Siraf may have provided as little as 50% of the city's needs.

During the survey, it became apparent that all cultivable land was used to its best advantage in the early Islamic period. This contrasts with the situation in the 1970s, when both the quantity and the intensity of cultivation were markedly lower. Fruit and vegetable gardens occupied only a limited area and the rest (mainly cereals) were merely rain-fed on any available land. The situation in the 1970s, however, was rather artificial because of cash incomes and the import of foodstuffs such as rice and flour. Nevertheless, it was apparent from field evidence that no major changes in land use have occurred over the last hundred years or more. Clearly, since

the heyday of Siraf, the intensity and the total area of cultivation have decreased and land which would have been used before was abandoned and in some cases was ruined irreversibly by gullying. At first glance, settlement locations appear to contradict this proposition. Siraf, and more especially its extra mural settlements at Bagh-i Sheikh and along the coast to the east, overlap the cultivable land, whereas Taheri and one or two other small modern settlements are built upon bedrock. In fact, some rain-fed cultivation and a small area of gardens occurred within what was once the city of Siraf.

Evidently, topography was the prime factor in moulding the general distribution of cultivation and it also partly determined the zone of intense cultivation around the city. Within this framework, economic factors helped define the inner intensive zone but further economic factors, namely those of urban land-use, led to the encroachment of settlement on to lands, which would normally be used for crops. Apparently, if city dwellers required extra land for building, the land most suitable for this purpose was chosen; this shows remarkable parallels with modern land-use in which land prices increase around cities, farmers sell out and the cities expand. Consequently, if crop production was to be maintained, one of the following solutions would need to be applied: (a) new land would need to be found within the agricultural region defined on Fig. 66; (b) the present land would need to be farmed more intensively; or (c) more food would need to be imported from the plain of Jam or from along the coast. This contrasts with the recent strategies of modern villages on this part of the coast, which entail siting the agricultural or fishing settlements on rock outcrops or

inferior land, leaving the best for cultivation. In other words, the local economy appears to have made an interesting shift from early Islamic times, when Siraf was part of a highly commercialised international economy, to 1973, when land was worked in a manner more like that of subsistence agriculture.

At this point, it is pertinent to contrast Siraf with its trading partner and sometime rival, Sohar. Sohar is situated on a broad coastal plain of alluvial fans and is surrounded by an extensive area of deep, relatively fertile loams irrigated by a variety of water sources (Costa and Wilkinson 1987). Surveys conducted by the writer between 1975 and 1978 showed that in the early Islamic period the town was surrounded by more than 4,000 ha of intensively cultivated and irrigated land: that is, more than six times the total calculated for Siraf. This again implies both that Siraf was using all its available land and that, if more land had been available, this, too, would have been brought into intensive cultivation. Furthermore, at Sohar any expansion of the urban area would merely have led to a re-adjustment in the area or the intensity of crop production within the large area available. In contrast to Siraf, this would lead to no discernible decrease in crop production. It is, therefore, by this apparent disregard for crop production from its immediate hinterland that medieval Siraf resembles many modern cities. This emphasises the fact that Siraf was generating sufficient trade for urban land to encroach with impunity on the adjacent cultivated land for this loss to be made up by the import of more food from other regions. On the other hand, Sohar would have been capable of supplying not only its own inhabitants but also ships frequenting the port.

Chapter 5

The High Valleys

Donald S. Whitcomb

In March 1973, the Iranian Center for Archaeological Research and the Siraf Expedition undertook a joint survey of the high valleys behind Siraf. The survey consisted of three short trips (Fig. 68): (1) to the Jam valley, especially the eastern portion, and the routes linking this valley with Siraf (four days); (2) to Galehdar, concentrating on the western end of this long valley (three days); and (3) further examination of the Jam valley and the routes to the west and north of it as far as the valley of Dezhgah (nine days). The party travelled by donkey, the only means of transportation in this high, remote region.

The primary purpose of the survey was to ascertain the nature and extent of Sirafi settlement (ninth–eleventh centuries) near Jam as a means of checking, through archaeological evidence, the assertions of medieval geographers that a close economic interdependence existed between the port and the highland valley (Al-Istakhri 1967: 128; al-Maqdisi 1967: 423). The Mountain of Jam, as it was known, was the locus of the final station in the caravan route from Shiraz and Firuzabad to Siraf; Jam was also a source of food, fruit and water for Siraf. We expected, therefore, that the investigation of the archaeological remains in the Jam valley would provide an important regional amplification of the results of the excavations at Siraf. The survey of the valley of Galehdar, comparatively larger and more fertile for grain crops, provided a context for the evaluation of the Jam materials and greatly increased our understanding of the later history of Siraf, between the thirteenth and the fifteenth centuries, when Galehdar was a significant cultural centre (Aubin 1969). Special attention was paid during the reconnaissance to mapping the ancient trade routes

in the region, extending the surveys of Vanden Berghe, who worked southwards from Firuzabad (Vanden Berghe 1961: 165–75; cf. regional surveys by Gaube 1973, 1979). Despite the difficulties inherent in tracing the ancient routes, numerous cisterns, rest houses and caravanserais were located and described, and sections of paved road were identified. The remains of buildings constructed in the Sirafi style were discovered along the entire route between Siraf and Jam, and between Siraf and Galehdar. Additional exploration in the western extension of the Jam valley and in the valley of Dezhgah followed the most likely route further inland, though the identification with the period of Sirafi domination is less pronounced.

The exploration of the archaeological remains of these three valleys and the routes connecting them recalled the words of Sir Arnold Wilson, who passed through this region in 1911: “Each valley was a social unit with its own leaders and headmen, its own reserves of grain and its own ancient traditions. Civilisation here is of extreme antiquity. Almost every valley has its mounds, probably older than Babylon, its own pre-Islamic rock tombs and inscriptions and its own bit of paved roads, inherited probably from Sassanian times” (Wilson 1942: 184).

While the ruins encountered in 1973 rarely measured up to Wilson’s romantic description, the implications of the varied and extensive archaeological remains raise intriguing questions about the patterns of social organisation and economic history in this relatively remote region of southern Iran. The description of the archaeological evidence collected in these brief reconnaissance trips, summarised in Table 3a, begins to suggest both the achievements and the complexity of ancient and medieval southern Iran.

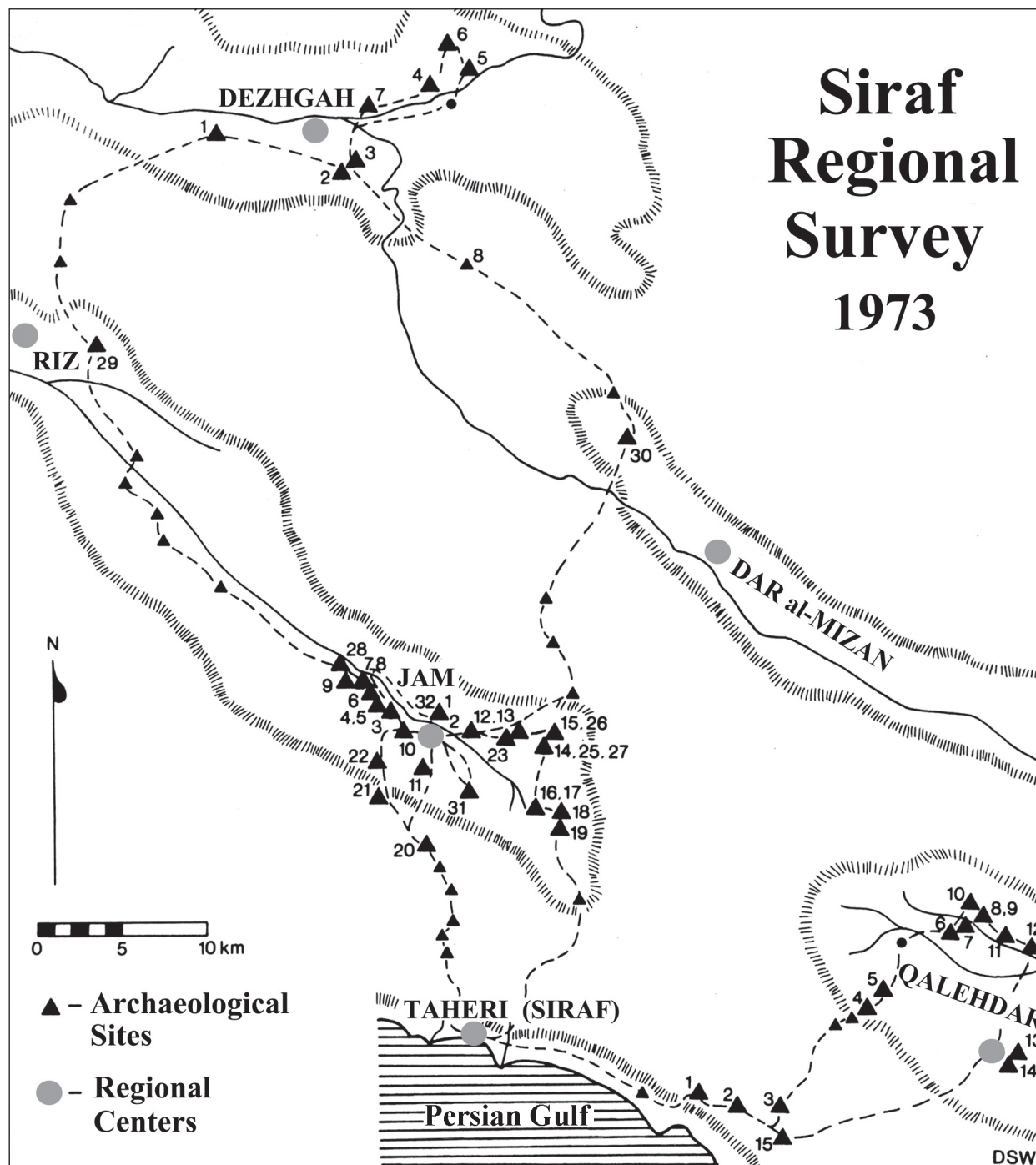


Figure 68. Sites in the high valleys.

From Siraf to Jam

The following is a gazetteer of archaeological sites examined in the course of the survey.

Tul-i Azizi (also called *Kol-i Kalat*) is located on a ridge east of the canyon of the Kunarak River about one farsakh from Siraf (the farsakh is a traditional

Persian measure of distance: i.e. that traversed in an hour, when one travels by donkey, a farsakh ranges from five to seven kilometres depending on the terrain). *Tul-i Azizi* is a single building east of the modern track, made of plaster and rubble, standing on a natural mound. The building (8 × 15 m and preserved



Figure 69. The route between Siraf and the valley of Jam. The coastal area visible is the mouth of the Kunarak.

to a height of 2.5 m) has two, or possibly three rooms, with vaulted roofs and niches in the walls. The angles are oriented to the cardinal points and those to the north and west have three-quarters round buttresses. A doorway with a corbelled arch leads into the central room from the southwest.

Bard-i Pahan is a group of at least three single-room structures on both sides of the track. They are made of plaster and stone, the northernmost being of large dressed blocks. The buildings measured 7×4 m $\times$ about 4 m high, and 14×4 m, with a preserved height of less than 2 m. A cistern east of the track measures 14×4 m, and it has rounded corners. The site is 2 km north of Tul-i Azizi, at a point from which the west wall of Siraf was fully visible. Beginning at this point, fragments of the ancient road, two to three metres wide and made of laid stones, are visible near the modern track (Fig. 69).

Gardan-i Kalat, at the top of the same ridge 3 km north of Siraf, is another tripartite building made of plaster and rubble (18×10 m, with a preserved height of 2.5 m) (Fig. 70). Here, a central *ivan* was flanked by smaller rooms and had semicircular buttresses at the entrance on the northeast side. Below this building to the east is a fragmentary wall, indicating the existence of an enclosure, at least 20 m long. West of the track is a cistern, which measures 16×4 m and has rounded ends, newly repaired and in use.

Kohru is a site at the top of a pass overlooking the village of this name, deep in the Qabr Rud canyon. Conduits of sweet water, originating at *Hermi*, pass through the canyon en route to Bagh-i Sheikh. The site is a single-room building made of plaster and rubble, measuring 8×4 m and preserved to a height of 1.5 m, with three-quarters round buttresses at the angles. A second building is almost completely obscured by scree from the mountain. Fragments of the ancient paved road again appear in this area.

God-i Ibrahim, in a small valley about 2.5 farsakhs from Siraf, is regarded as the half-way point to Jam. A track to Bid-i Khar diverges at this point. The main building has a large courtyard, measuring approximately 20×20 m, with long, narrow, vaulted rooms on each side (Figs 70 and 71). The entrance is from the south, through the central of three rooms; small corner rooms are also found on the south side. The northern range of rooms, which measures 18×3 m and has three entrances, is the best preserved (1.5 m high). Two doorways appear to have opened onto the court from the east and west blocks. Southeast of this structure is a building with a single vaulted room, again of plaster and rubble, measuring 18×7 m and preserved to a height of 1 m, with three-quarters round buttresses at the angles and an entrance in the western long side. Also in the immediate area is a cistern with

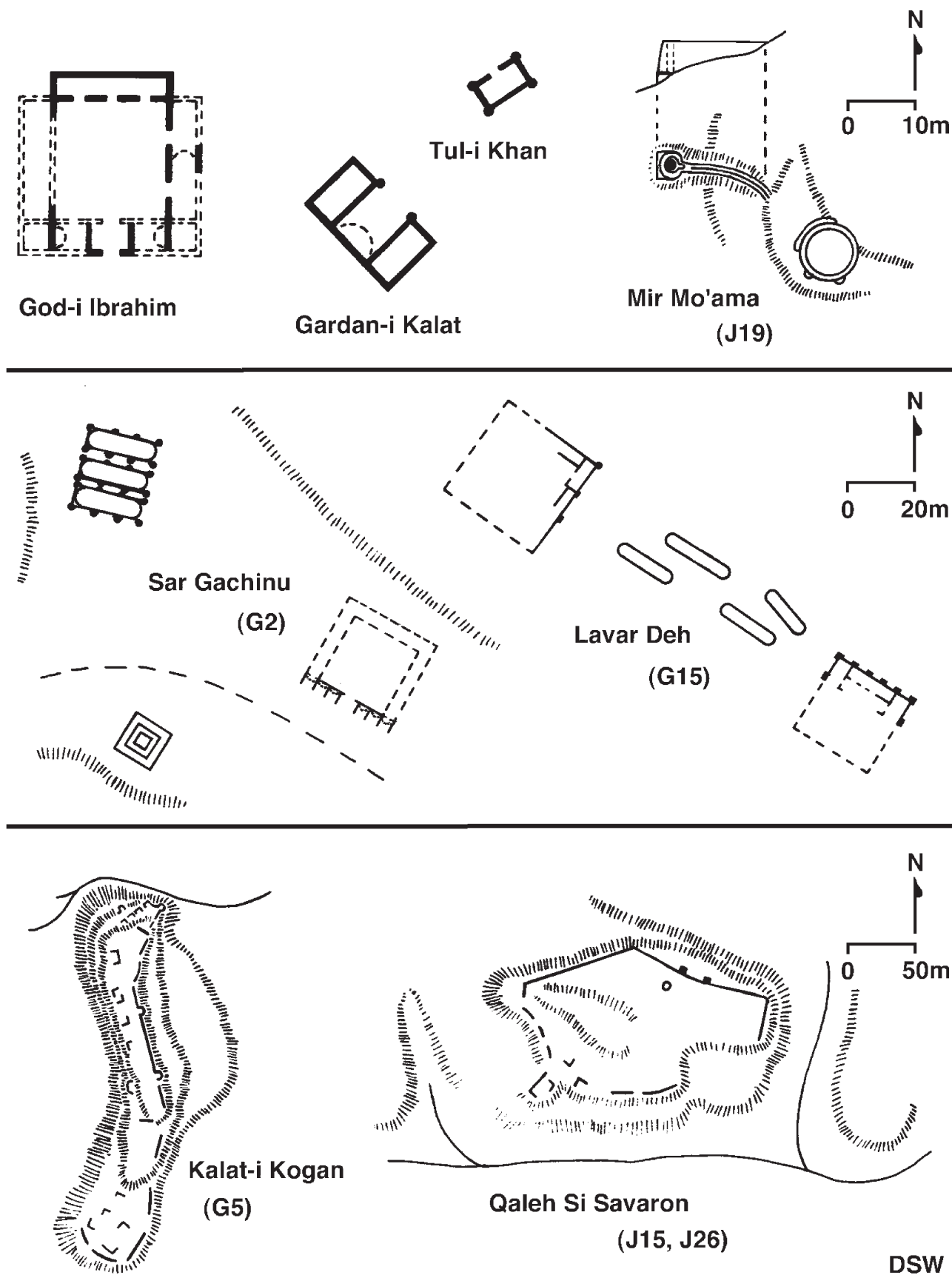


Figure 70. Sketch plans of selected sites.



Figure 71. Ruined buildings at God-i Ibrahim on the route between Siraf and Jam. The valley of Jam is behind the hills in the background.

rounded ends, measuring 18×4 m, a conduit and other fragmentary walls, possibly field terracing.

God-i Ibrahim Pa'in is located three kilometres beyond the valley, as one climbs the pass before *Hermi*. This is a small building (9×10 m) with two vaulted rooms, situated on the hillside west of the track. Made of plaster and rubble, it is well preserved (height 3 m) with one-third of the roof in place and niches in the north wall. Ibrahim is said to have been a merchant from Taheri.

Berkeh Deseri, also known as Sar-i Gardaneh Kohru, is a crescent-shaped cistern (14×4 m) with rounded ends, lying west of the track, about 1 km north of the preceding site.

Bard-i Neveshta, at the top of the pass before *Hermi Bash*, is a boulder lying on the west edge of the track. As its name suggests, one surface is covered with pictographs (animals, men and abstract patterns) in a variety of styles and an inscription, possibly in Aramaic script. The size of the stone is 2.6×1.5 m; the design area is 1.6×0.6 m.

Hermi and *Hermi Bash* (J20) are about three farsakhs from Siraf, at a point where two springs with date groves are separated by a low pass with terracing walls but no building. To the west of the pass is a high scarp

dramatically cut off on all sides by deep gorges. Several ruined buildings can be seen on this high mesa; one is said to have been a windmill. Sections of the ancient road cross the pass between the terracing walls. About four farsakhs from Taheri, a modern track turns off for Jam at God-i Bard-i Zinat, passing east of Kuh-i Padri. This track is the route we followed during our first trip; the remainder of the ancient route was followed during the third trip.

Padri (J21) is a village below the great, needle-shaped mountain of Kuh-i Padri (2,152 m), surrounded by terracing and rock-cut conduits (Fig. 72). A cemetery with gravestones lies behind the village. Numerous sections of the ancient paved road wind round the south and east sides of the foot of the mountain.

Kuh-i Padri appears to have a curtain wall defending the summit and numerous vaulted buildings; unfortunately on neither trip were we able to survey these remains, although Mr Mahmud Kordvani of the Iranian Center for Archaeological Research recorded local reports of buildings in 1966.

God-i Sal be Kuh (J22), two km beyond Kuh-i Padri, is a large dam, made of *sārūj* and rubble, closing a high gorge. Only half of the dam survives; it was



Figure 72. Kuh-i Padri.



Figure 73. The valley of Jam, seen from the western approach looking east-southeast.

over 25 m long, 3.5 m wide at the top and over 15 m high, forming an arc with the concave surface facing down stream. Two semicircular buttresses supported the outer, concave face of the dam. Below the dam is a series of conduits, terrace walls, and fragments of buildings; one of the buildings, cut by the flow of water, shows walls and floor in section, buried beneath 1.5 m of silt. The description of this complex

is very reminiscent of Stein's (1937: 215) Kul-i Kharg. Vanden Berghe (1961: 171) mentions that near Padri are a tomb cut in the rock, channels and a barrage, the last of which may refer to this dam. From this point a multitude of descending tracks lead to the several villages in the Jam valley (Fig. 73); the ancient route seems to have led toward Tul-i Baba Mobarak (J6) or Tul-i Qaleh (J7, J8).

The Jam Valley

According to local tradition, the occupation of the Jam valley was divided into two localities: Baharistan on the north bank of the river, centred on Minareh, and Negaristan on the south bank, centred on Bid-i Khar (Fig. 74: s–x).

Minareh (J1) is located about one kilometre north of Velayat (Jam), the modern administrative centre of the valley on the banks of a river. The ruins form a long, vaguely defined area of foundations and pottery scatter bordered by *Bohreh Hajji Noshod* (J2) on the east and *Bohreh Bagh* (J32) on the west. A low central mound called the “minaret” is in the centre of this area, which is 25 m in diameter and 3.5 m high. Numerous limestone capitals and column bases are said to have been uncovered there, suggesting the presence of a mosque or even a pre-Islamic building. At *Bohreh Hajji Noshod*, a furnace is said to have existed. Reputedly, it had parallel chambers over 2 m long and 0.5 m wide, with highly fired walls. It may have been a pottery kiln or a glass furnace.

Bid-i Khar (also called Bod-i Khar) is south of Velayat (Jam) at a distance of about three kilometres, near the foot of the mountains. This is an area of ruins similar to that of *Minareh*, beginning east of the present gardens and extending over 500 m into the plain. Near the centre is a small building called Tul-i Khan, made of plaster and stone, with semicircular buttresses on the corners. The building measures 7 × 4 m and is preserved to a height of 1 m. The long northwest face has a single doorway.

North of the modern village is a large mound, which measures 55 × 35 m, is 2 m high and has traces of foundations. The mound is called *Tul-i Shisheh* (J31). The name, “mound of glass”, is more properly applied to the area immediately south of the mound, where the surface, perhaps 100 m², is covered with slag and other debris from a glass factory. No other structures seem associated with this ruin, since all available building stone has been reused in modern semi-permanent shelters. This site was first recorded by members of the Siraf Expedition in 1966, when the glass factory was found to be associated with “scraps of Ming dynasty or later porcelain and Islamic pottery decorated in black under a clear turquoise glaze” (Whitehouse 1968: 19). The ceramics illustrated here (Fig. 74: a–r) appear on the whole to be somewhat earlier, roughly ninth- to twelfth-century, and at least partially contemporary with those from *Minareh*.

Kalatu is a high crag directly overlooking Bid-i Khar with a dry stone defensive wall and possibly rooms, as well as two oval cisterns made of *sārūj* and rubble, measuring 9 × 4 m and 7 × 4 m. Another structure on

an isolated lower slope may have been a rectangular cistern, measuring 12 × 4 m. The site is described by local inhabitants as having exceptionally sweet water, constant cool summer breezes and a short, but difficult track down to the coast.

Do Lengeh (J12, J13) is a scatter of pottery and traces of foundations about two kilometres east of Velayat (Jam) on a terrace north of the river. The ceramics suggest a relatively early, possibly Sasanian, occupation.

Qaleh Si Savaron (J15, J26; also known as Koleh Gorg) is located about one farsakh from Velayat (Jam) at the eastern end of the valley overlooking the pass to the Galehdar valley and to the north. The site is a small tabular mesa isolated by a deep gorge. Approximately half of the circumference at the top is protected by a curtain wall of roughly dressed stone, especially on the more exposed eastern side (Fig. 70). Two semicircular bastions, approximately 3 m wide, occur before a deep well. On the southeast are fragments of buildings in the so-called “gate” area: one vaulted room as well as two oval cisterns made of *sārūj* and rubble measuring 9 × 4 m. Another structure on an isolated lower slope may have been a rectangular cistern measuring 12 × 4 m.

Khaneh Kal (J14, J25) is situated 500 m west of Qaleh Si Savaron on the plain. It is a small vaulted building of plaster and rubble measuring 16 × 4 m and with a preserved height of 1.5 m, with one semicircular buttress on a corner and two doorways opening on the long northwest side onto a large courtyard. The area is surrounded by terraced fields.

Shekaftah Tabarkan (J27) is a shallow cave, partially man-made, near the track to Khengak, and opposite to Qaleh Si Savaron. Pottery collected from the talus was similar to that from *Minareh*.

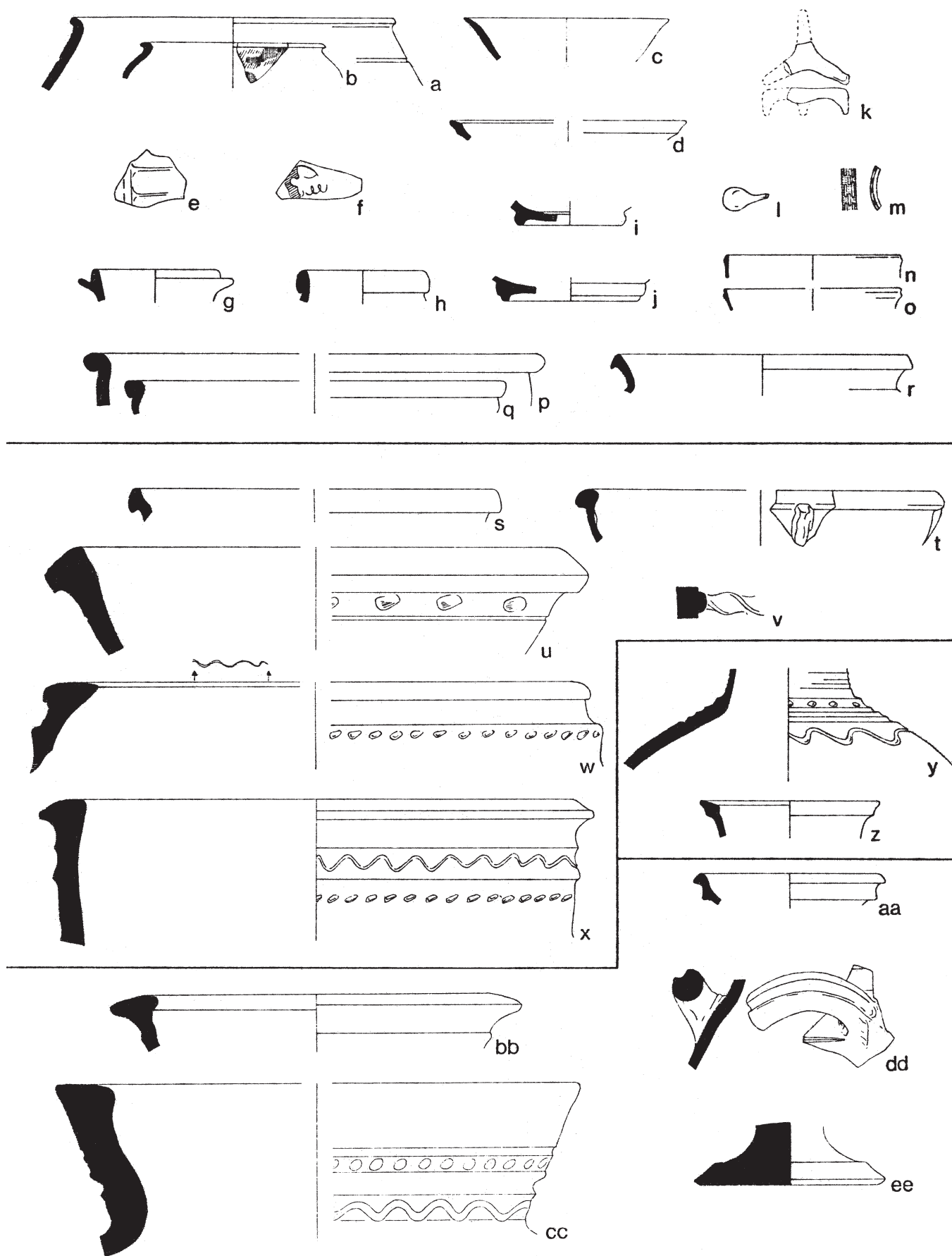
Qabr Turkeh (J24), located about 500 m north of *Chah Talkhu*, is a small enclosed valley with a cemetery. Several grave covers, similar to those at *Padri*, were found. At the northeast end of the valley were a cistern (20 × 4 m) and traces of a building.

Chah Talkhu (J23), one kilometre east of the village of Do Lengeh, is an area of fragmentary building foundations and an old *qanāt* system. The ground is particularly rich in flint artifacts, which extend for about one kilometre as far as the bluffs to the north.

Chaheh (J16), in the southeastern corner of the valley, consists of numerous buildings (30 to 40 m²) of dry stone construction, using sandstone blocks of about 0.5 × 0.5 × 0.2 m.

Tul-i Bard (J17), a raised terrace behind the modern village of Chaheh, has a concentrated scatter of worked flints measuring about 100 × 40 m. Nearby are several caves, all of which seemed to be sterile.

The first trip departed from Chaheh by an alternative



DSW

Figure 74. Ceramics and glass from Jam and Galehdar valleys. (Scale 1:4.)

route for the return to Siraf. We encountered only a few archaeological remains, which are as follows:

Sineh Zazi (J18) is a modern fort built on the side of a narrow river bed about 3.5 km southeast of Chaheh. This building seems to be constructed upon earlier ruins, which formed a slight mound measuring 150 × 50 m. Ceramics collected here appear to be similar to those from Minareh.

Mir Mo'ama (J19), located two kilometres south of Sineh Zazi, is a very large and impressive mill and cistern at the junction of two wadis (Fig. 70). The cistern is circular, three metres in diameter and three metres deep, with semicircular buttresses on the exterior. The remains of a conduit can be traced as a deep gash across the face of the mountain; this conduit, heavily encrusted with calcareous deposits, feeds the cistern and mill, and diverts excess water past the site. The mill is of the "Norse" type (Wulff 1966: 280), 4.5 m high at the water drop (2 m wide at the base and 1.8 m wide at the top). The millhouse is buried in silt and debris.

Sar Riz is a cistern just below the track about two farsakhs from Chahah, measuring 14 × 4 m, with rounded corners. No other antiquities were encountered until the vicinity of Siraf. It would seem that our return route took us too far to the east along a rarely utilised track, unfavourable due to the lack of water and its rough descents. It is far more likely that an alternate route from the Jam valley departed from Bid-i Khar, the major settlement of the eastern end of

the valley, passing Kalatu, Ghar-i Khaq, Patueh and joining the route which we travelled near Cheshmeh Kal. This route meets water at Dar Nafas, where there is a small waterfall, and continues with the stream through the gorge called Tang-i Laqlaqeh.

Continuation of the Jam Valley

Tul-i Cheghoseh (J11) is situated directly to the southwest of Velayat (Jam) on a high natural hillock of sandstone. The summit is a flat oval area, 180 m long and 80 m wide, which is covered with foundations of plaster and rubble. The preserved height was never more than 0.5 m, but individual structures and narrow streets could be determined. The periphery has a dry stone wall with bastions, and in the centre is a modern tower. On the southern edge are two oval cisterns, both about 9 × 4 m, and a deep well with a square shaft. At the foot of the hillock is a concentration of worked flints.

Bagh-i Qaleh (J10) is located between Tul-i Cheghoseh and the river in a palm grove. Here are several sections of *sārūj* and stone weirs, the best preserved of which is over 40 m long, 0.8 m wide and 1.5 m above the present ground surface. Seven semicircular buttresses brace the down-stream side of this weir.

Nargesi (J3), on the south bank of the river about two kilometres west of Velayat (Jam), is a small hillock with building remains. The ruins are made of plaster and

Figure 74 (opposite). Ceramics and glass from Jam and Galehdar valleys.

Tul-i Shisheh (J31): a. Grey ware, grit temper; b. Orange-tan ware, white glaze on interior and exterior, green and brown glaze on exterior, grit temper; c. Orange-tan ware, green glaze on interior and exterior, grit temper; d. Orange-tan ware, green glaze on interior and exterior, grit temper, diameter unknown; e. Cream ware, thick green glaze on interior and exterior, incised ribs, grit temper; f. Orange-tan ware, white and green glaze on interior, incised decoration, 0.7 cm thick; g. Cream ware, green glaze on exterior, grit temper; h. Cream ware, black slip on interior and exterior, grit temper; i. Orange-tan ware, green glaze on interior, yellow glaze on exterior, grit temper; j. Orange-tan ware, thick green glaze on interior, traces of yellow glaze on exterior, grit temper; k. Orange-tan ware, cream slip, grit temper; l. Dark blue glass (drip); m. Dark blue glass bracelet; n. Light green glass; o. Light green glass, diameter unknown; p. Orange-tan ware, red slip on interior and exterior, large black grits, 42 cm diameter; q. Orange-red ware, black slip on interior and exterior, grit temper, diameter unknown; r. Cream ware, black slip on interior and exterior, grit temper.

Minareh (J1): s. Orange-tan ware, brown slip on interior, grit temper, diameter unknown; t. Cream ware, black slip on interior, spalled green exterior, heavy black grit temper, diameter unknown; u. Black ware, punctate decoration, heavy sand and grit temper, diameter unknown; v. Orange ware, cream slip on exterior, diameter unknown; w. Orange-tan ware (reddish core), black slip on interior and exterior, punctate and incised decoration, grit temper; x. Light grey ware, orange-tan surfaces, incised rim, punctate decoration, grit temper, diameter unknown.

Baba Mobarak (J6): y. Dark red ware, black paint on rim, incised and punctate decoration, sandy grit temper; z. Dark red ware, light grey slip on interior and exterior, grit temper.

Kalat-i Kogan (G5): aa. Grey-brown ware, black slip on interior and exterior, grit temper; bb. Brown ware, brown-orange slip on interior, yellow-cream slip on exterior and rim, grit temper; cc. Grey ware, cream-brown slip on interior and exterior punctate and incised decoration, grit temper; dd. Dark grey ware, black slip on interior and exterior, grit temper; ee. Cream ware, grit temper.

stone, and have a courtyard with a well and a row of three small rooms against the north side. The overall size is 18×20 m, with a preserved height of 0.5 m.

Fal Goveh (J4, J5) is an area immediately west of Nargesi with numerous dry-stone foundations. Most of the structures have a large courtyard with one to three small rooms attached to one side, as we observed at *Nargesi*.

Tul-i Baba Mobarak (J6), beside the river, about 500 m west of Nargesi, is a high natural hillock with sheer sides and a flat top, measuring 200×60 to 100 m. The western part (approximately half the area) is covered by a modern settlement built on the earlier foundations; such remains are visible in the eastern part as fine plaster and stone walls, some diagonal to the rectangular shape of the mound. The perimeter is defended by a wall with semicircular buttresses and on the south side by a guard tower near some entrance steps. The preserved height of these walls is generally not more than one metre. The ceramics (Fig. 74: y-z) appear to be either early Islamic or, more probably, late Sasanian.

Tul-i Qaleh (J7, J8) is situated on a high bluff very similar to *Tul-i Baba Mobarak*, about 1.5 km to the west. The modern settlement obscures most of the ancient remains, but traces of plaster and rubble walls can be seen on the eastern end. On the wider portion (the entire area is about 100×60 m), a modern fort rests immediately over an earlier structure with semicircular buttresses, measuring about 20 m². Below the hillock is a short weir, like that at *Bagh-i Qaleh*.

Imamzadeh Shah Mohammad (J9) is on a high terrace about 500 m southeast of *Tul-i Qaleh*. The shrine, surrounded by a cemetery, is a square building, 4 m across, containing two tombs. It is preserved as high as the springing of the squinches, about 3.2 m. The entrance and *mihrāb* have painted arches; the *mihrāb* is flanked by two niches and each side wall has one small niche. The walls are 0.7 m thick and are made of plaster and rubble.

Berkeh Tul-i Qaleh (J28) is located less than 500 m west of *Tul-i Qaleh*. The *berkeh* is a circular cistern, 20 m in diameter with six semicircular buttresses. A conduit enters from the east and a lead-off channel on the opposite side feeds a mill, three metres below the channel. The entire structure is similar to that at *Mir Mo'ama* (J19). Both sides of the valley show traces of conduits; that on the south bank seems to be the more ancient. The cistern was found during our second trip to the Jam valley and the investigation of the routes to the north and west. The route following the lower Jam valley down to the Riz Rud valley may be described briefly at this point.

Khaneh Qaleh, about two farsakhs west of *Tul-i Qaleh*

near the village of Ab Gormak, is a terrace north of the river with at least four buildings made of dry stone, the rooms measuring from 7 to 12×4 m, preserved to a height of one metre.

Gardeneh Parchehgah, three farsakhs from *Tul-i Qaleh*, is a low pass north of the river with a guard house of dry stone and a small round cistern, 4 m in diameter.

Molvard, about two kilometres farther down the valley, is a cluster of several dry stone buildings on a high terrace south of the river; the preserved height is 1.5 m.

Shahr-i Khas is located about four farsakhs from *Tul-i Qaleh*. This is a large village south of the river, built on a high natural hillock dominated by a modern mud-brick fort. Near the river are two mills of the "Norse" type, both made of *sārūj* and rubble and perfectly preserved except for the mill rooms; these survive to heights of 4 m and 2.5 m respectively.

Khibitu, two kilometres from *Shahr-i Khas*, is a diversionary dam channelling run-off into conduits before it reaches the river. The dam, on the north side of the river, is made of *sārūj* and rubble. It is about 25 m long and 3 m high.

Tumb-i Hamam (J29), 500 m west of the village of Tashan in the Riz valley, is an area of low mounds about 200 m², some of which have stone building foundations. Fragments of a conduit connect these mounds, running parallel to the mountains on the north side of the valley. Similar ruins are said to exist in the western part of this valley near the village of Riz. Ceramics collected from these mounds suggest a transitional Sasanian-early Islamic date for the occupation of this site (Fig. 75: f-j).

The Galehdar Valley

The trip to Galehdar retraced the reconnaissance made by Stein in January and February 1933 (Stein 1937: 214). Stein began at Puzeh on the coast and entered the mountains along the traditional route. Although the ascent was "steep and difficult from the start" (*ibid.*: 214), both surveys noted traces of a properly engineered route, with a paved road for caravans of camels.

Yod Kusht (G1, Stein's Yahud-Kush) is located on a high, flat ridge on the south side of a mountain about one farsakh from the coastal village of Parak. The site measures 100×250 m and includes a caravanserai, at least four cisterns, and vaulted buildings. All structures were made of plaster and pink limestone, which was quarried in the vicinity. Most of the buildings are simple one-room shelters, though there is one two-room building with its vaulted roof still intact. Otherwise the preserved height is generally about 1.5 m. Some of the

buildings have three-quarters round buttresses on the angles; the cisterns generally measure 15 to 20 × 5 m, with rounded corners. The site is the meeting point of a track from the minor port of Shirinu. Stein visited this caravanserai and the cisterns, which he described as near a narrow palm grove known as Badamesh.

Sar Gachinu (G2), located three kilometres further along the track, is a fine caravanserai (partly destroyed by recent road building) on a narrow ridge (Fig. 70). The caravanserai has a high pointed-arch gateway flanked by three vaulted rooms on either side, all perfectly preserved. Recent mounds of rubble suggest that many more rooms were preserved forming a “square serai” (called Gachino by Stein 1937: 214). The structure is reminiscent of the caravanserai at Konar Siah visited by Vanden Berghe (personal communication; cf. Vanden Berghe 1961: 169). Behind the gateway is a large courtyard, 30 m², with stables against the far wall, which have a preserved height of 1.5 m. Opposite the caravanserai is a single building, which measured 12 × 12 m and appeared to be of stepped construction; the preserved height at the centre was 2.5 m. There is a row of cisterns about 200 m west of the caravanserai, the best preserved of any found on the trip. Each cistern measured 21 × 6 m, and had rounded ends and eight semicircular buttresses along the sides and ends; they stood about 2.5 m high and were at least 3 m deep. Parts of the vaulting were still in place; the opening for drawing water was on the southeastern end of each cistern. Stein spent the first night near the next pass called Kul-i Kharg, where he noted a basin measuring 300 × 100 yards (274 × 91 m) and a dam measuring 40 feet (12 m) long and 20 feet (6 m) wide. Our route bypassed this site and we did not visit the dam.

Lavar Gol (G3) is about two and a half farsakhs from Parak, at the end of the long ridge of Sar Gachinu. This small, circumscribed valley has numerous foundations of buildings and at least five cisterns, measuring 16 × 4 m, with rounded ends. One single-room building, made of plaster and rubble, measured 8 × 5 m, with a preserved height of 1.5 m and square corner buttresses. According to Stein (1937: 215), in his day the ruins of Lavar Gol were called Gabr-Khanaha.

Maveskun (Stein’s Mirzabun, *ibid.*: 216) is situated on a low pass before entering the long gorge leading to Nowabad in the Galehdar valley. A few very fragmentary building remains were noted.

Tang-i Bidu, is one farsakh from Nowabad. Sections of cobbled road were noted here.

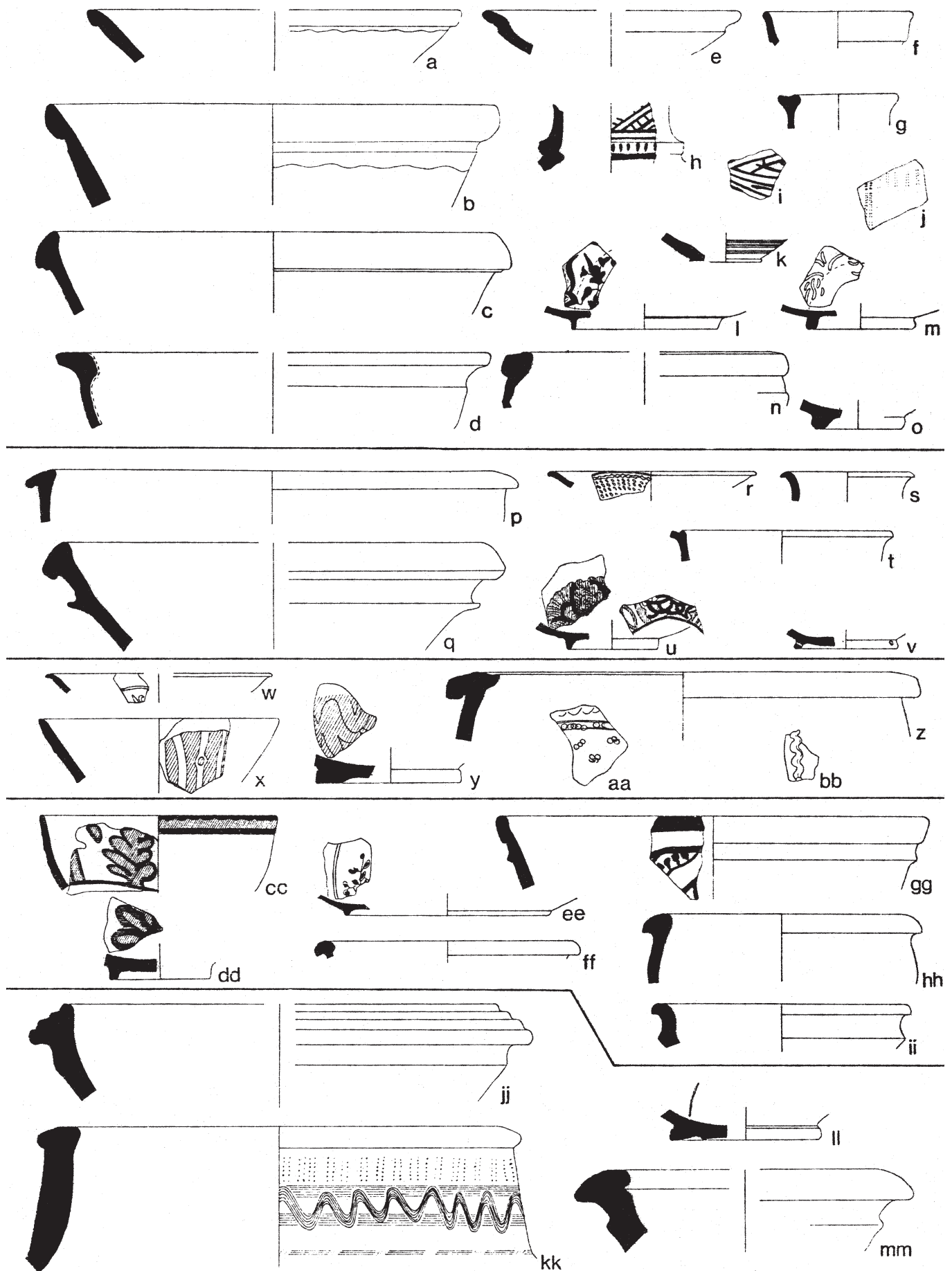
Tebekali (called Tawakali by Stein 1937: 216) is located one kilometre beyond Tang-i Bidu. It is a cultivated terrace with two ancient mills, similar in size and design to that of Mir Mo’ama. At this point Stein turned westwards, while we followed the conduits into the valley.

Shalo (G4), located about three kilometres from Nowabad, is a large caravanserai with a cistern and other buildings, on a ridge before the final descent into the Galehdar valley. The caravanserai has several long vaulted rooms ranged around a central courtyard, which is about 20 m², and a gateway on the northwest side. One semicircular buttress was found on the east corner. The preserved height is less than 1.5 m. The cistern was of the usual rectangular shape with rounded corners, but this and at least five other buildings were very difficult to discern among the mounds of rubble. A conduit passed on the east bank of the wadi, often cut into the face of the mountain.

Kalat-i Kogan (G5) is a massive defensive structure on a high mountain ridge about 1.5 km south of Nowabad. Along the gorge to the west of the ridge are at least two levels of conduits cut into the rock and supported in places by arches. The ridge, which measures 500 × 100 to 200 m, has steep cliffs on the west side and is protected on the east by a strong curtain wall with semicircular bastions about 3 m wide (Fig. 70). The entire summit is covered with foundations; the usual size of the structures is about 10 × 6 m. In the north is an artificial cave and a deep well. A number of smaller vaulted buildings appeared to be very similar to the tomb towers of Site O at Siraf (see pp. 46–50). Stein (1937: 225–26) made a special trip to visit this site and found only coarse red pottery; the ceramic materials recovered in 1973 (Fig. 74: aa–ee) appear to be late Sasanian.

Kabk-i Kuchek (G6; also called Kal-i Kuchek) is the first of a series of sites on the north side of the valley beginning at Nowabad, the principal settlement at the west end of the Galehdar valley (Gaubé 1980: 158). Two kilometres from this village is a low mound, the remains of a single building, which measures 20 × 15 m and has square pillars in the centres, probably a mosque. Several stone grave covers were found on the slopes of the mounds. They bear the dates 681, 890, 894, and 920/1282–1514 (cf. Gaubé 1980: Taf. 36.1, 3). The foundations and semi circular buttresses suggest that an earlier building phase might also be present.

Kuh-i Shekak (G7) is a large area, perhaps one kilometre square, beginning on the edge of Kabk-i Kuchek and extending west and north toward Qaleh Sar Gah. Numerous mounds, 2 to 4 m high and 30 to 60 m in diameter, indicate the ruins of a settlement of mud-brick construction (a few fired bricks were found; they measured 0.4 × 0.2 m). This site would seem to be Stein’s Kashkuk, where he picked up bluish green glazed ceramics and pieces of porcelain (Stein 1937: 217; pls. XXVI, Kash 6 and XXVI Kash 7). The ceramics indicate a chronological range from the thirteenth to the fifteenth century, with the possibility of earlier occupation (Fig. 76: a–o).



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Figure 75. Ceramics from Galehdar valley. (Scale 1:4.)

Chah Mo'avan (G8, G9) is a similar area of mounds extending for more than two kilometres east of Qaleh Sar Gah towards Asir. The mounds, 3 to 5 m high, were generally in overlapping rubble, though occasionally isolated mounds were also observed. Sherds were collected in two arbitrary groups: I (G8) which was nearer to Qaleh Sar Gah and early Islamic 6 date; and II (G9) which was nearer to Asir and similar to Kuh-i Shekak (Fig. 76: w–bb, cc–ii; Gaube 1980: 158, Taf. 34).

Shaldun (G10), one kilometre west of Asir, is a natural mound, 5 m high, with foundations on the top and perhaps also a defensive wall, made of both stone and brick. The mound stands near the mountains on the northern side of the valley; other building foundations were found around the base of the mound (Fig. 76: p–v).

Asir (G11) is a modern village on this side of the plain, probably built on an earlier settlement, as Stein noted (1937: 217). Along the river edge several structures were visible: a mosque (?) with one pillar still standing at least 4 m high, a bath house with pointed vaulting, and a round cistern covered with a dome. Stein collected green-glazed wares and blue and

white porcelain from these ruins in and around the modern village (*ibid.*: pl. XXVI, Asir 22). This extensive series of mounds from Nowabad to Asir impressed Stein, as it did our group, with the large population and agricultural enterprise which it implied.

Tumb-i Tir (G12), the present name for Stein's (1937: 221–23) Tal-i Pir, is a low mound near the village of Haraj covered with painted pottery and worked flints. The site was discovered and briefly excavated by Stein. Behind Haraj are the massive walls of a fort called Takht-i Pirist (*ibid.*: 225).

Tumb-i Pudu (G13) is a large conical mound, 50 m in diameter and 12 m high, located about 500 m east of the village of Galehdar. There are stone foundations on the top and a great variety of ceramics, including painted wares like Tal-i Pir (Stein 1937: 225), red wares, and bluish green glazed wares (*ibid.*: 220).

Tumb-i Pir Mardi (G14), located about 200 m south of Tumb-i Pudu, is an imamzadeh in the centre of a cemetery (Gaube 1980: 158–59). Some building foundations were found among the graves, and ceramics pointing to a Middle Islamic date of occupation (Fig. 76: jj–mm).

Figure 75 (opposite). Pottery and porcelain from Galehdar valley.

Kuh-i Shekak (G7): a. Cream ware, blue glaze on interior and rim, grit temper, diameter unknown; b. Cream ware, dark blue-black glaze on interior and exterior, grit temper; c. Red ware, brown-black slip on interior and exterior, heavy grit temper; d. Red ware, orange surfaces, brown slip, heavy grit temper, diameter unknown; e. Cream ware, olive-green glaze on interior, grit temper, diameter unknown; f. Grey ware, grit temper; g. Cream ware, thick green glaze on interior and exterior, grit temper; h. Cream ware, brown paint, friable grit temper, diameter unknown; i. Cream ware, orange-tan surfaces, cream slip on exterior, light brown paint, grit temper, 1.0 cm thick; j. Orange ware, cream slip on exterior, punctate decoration, grit temper, 0.5 cm thick; k. Cream-yellow ware, comb decoration, grit temper; l. Cream ware, blue and white glaze, grit temper; m. Cream ware, dark green glaze on interior, light green glaze of exterior, sgraffiato decoration, grit temper; n. Red ware, black slip on interior and exterior, grit temper, diameter unknown; o. Cream ware, blue-green glaze on interior and exterior, grit temper.

Shaldun (G10): p. Orange-tan ware, light grey slip on exterior, grit temper; q. Grey ware, grey slip, white grit temper, diameter unknown; r. Cream ware, brown glaze, green band on interior, sgraffiato decoration, grit temper; s. Black ware, black slip on interior, grit temper; t. Orange-red ware, grit temper; u. Cream ware, blue and white glaze, grit temper; v. Cream ware, white glaze on interior and exterior, traces of brown decoration on interior, grit temper, hole drilled in base.

Chah Mo'avan I (G8): w. Cream ware; yellow glaze on interior and exterior, sgraffiato decoration, grit temper, diameter unknown; x. Cream ware, light blue glaze on interior, light yellow-brown and light blue glaze on exterior, grit temper; y. Orange-tan ware, light green glaze on exterior, dark green glaze on interior, sgraffiato decoration, grit temper; z. Red ware, grey surface on exterior, brown-black wash on interior and exterior, white grit temper; aa. Cream ware, incised decoration, grit temper, 0.7 cm thick; bb. Cream ware, thick green glaze on interior and exterior, appliqué strip, grit temper, 0.9 cm thick.

Chah Mo'avan II (G9): cc. Cream ware, white glaze with blue and black decoration, grit temper; dd. Cream ware, white glaze with blue and black decoration, grit temper; ee. Porcelain, blue and white decoration; ff. Cream ware, dark brown slip on interior and exterior, grit temper; gg. Cream ware, green glaze on interior and rim, brown underglaze paint on interior, grit temper; hh. Light grey ware, orange slip on interior, black slip on exterior, grit temper; ii. Dark grey ware, black slip on exterior, grit temper.

Tumb-i Pir Mardi (G14): jj. Grey ware, greenish white slip on exterior, black slip on interior and rim, heavy grit temper, 46 cm diameter; kk. Cream ware, light cream slip, punctate and comb decoration, grit temper; ll. Orange-tan ware, yellow glaze on interior, sgraffiato decoration, grit temper; mm. Dark red ware, orange surfaces, cream-orange slip on interior, heavy grit temper, diameter unknown.

Unfortunately, the survey was unable to follow Stein's itinerary (1937: 220) further east from Galehdar to the important medieval centre of Fal or Dar-us-Safa, which has ruins and tombstones that would have shed further light on the fourteenth- and fifteenth-century occupation of the valley.

We returned to Siraf by an alternate route, which entered the mountains south of Galehdar, traversed the Tang-i Bandari (or Tang-i Allahdari) and rejoined the first route just before Sar Gachinu.

Bonahail, about one farsakh from Galehdar, is a series of cisterns where the long, deep gorge ends and the track turns west. There are four cisterns made of *sārūj* and stone, all measuring about 14 × 4 m and with rounded ends. A vaulted building was seen on the west bank of the river.

Lavar Deh (G15) is located in a long fertile valley about 2.5 farsakhs from Galehdar on the opposite side of the mountain from *Lavar Gol*. There are two caravanserais and at least four cisterns, measuring 17 to 20 × 4 m, with rounded ends (Fig. 70). The larger building, 20 m², has only one corner preserved. Evidently it consisted of a series of vaulted rooms surrounding a courtyard. The structure is made of

plaster and rubble with semicircular buttresses on the corners and square buttresses along the walls. The second building, approximately half of which survives, was about 25 m² and had the same configuration. Here the buttresses are all square in section. Both buildings are preserved to a height of about 1.5 m.

Chah Amri is a small site encountered upon reaching the coastal plain about midway between the villages of Puzeh and Parak. A large building, 30 m², and a smaller structure with four rooms were discernible among the mounds of rubble. The vaulting of the smaller building was still extant, while the remaining walls were less than one metre high.

The Dezhgah Valley

The route to Dezhgah proceeded from the Jam valley westwards as far as Riz and then turned north, climbing a very difficult mountain pass.

Dashtak, located one farsakh north of Tashan (Riz), is a wide terrace with a cistern and two one-room buildings. The cistern had been repaired recently; it measures 10 × 4 m and has rounded ends.

Figure 76 (opposite). Ceramics and glass from Dezhgah valley.

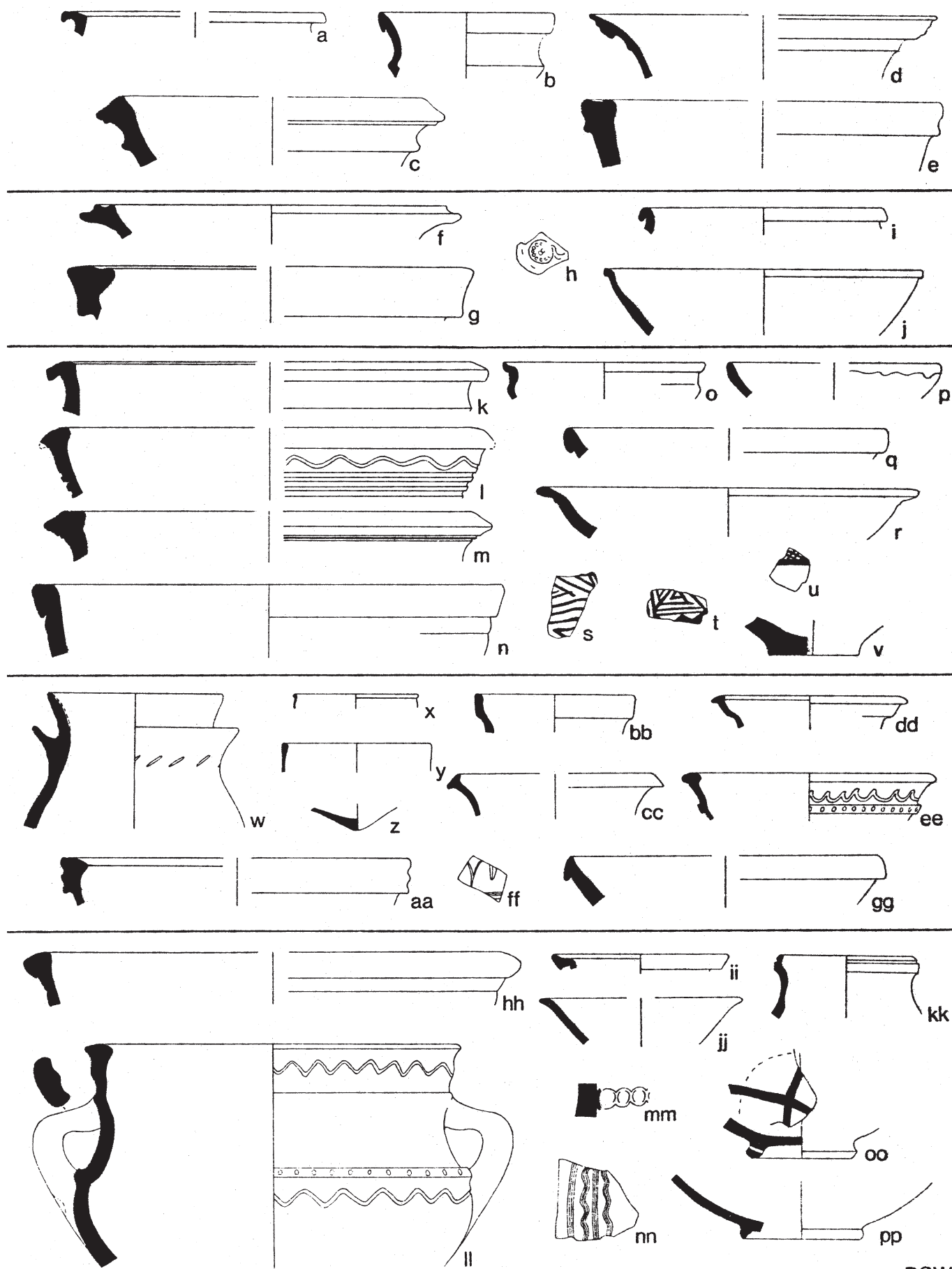
Tall-i Gori (D5): a. Dark grey ware, grit temper, diameter unknown; b. Cream ware, grit temper; c. Grey ware, grey slip, heavy grit temper, 50 cm diameter; d. Grey ware, grey slip, grit temper, diameter unknown; e. Cream ware, cream slip, black grit temper, diameter unknown.

Tumb-i Hamam, Riz (J29): f. Cream ware, black slip, heavy grit temper; g. Red ware, black slip on exterior, heavy grit temper, 38 cm diameter; h. Cream ware, thick green glaze on interior and exterior, appliqué decoration, grit temper, 1.3 cm diameter; i. Cream ware, black slip on interior, black grit temper; j. Cream-pink ware, green glaze on interior and rim, yellow glaze on exterior, grit temper.

Sheikh Abdullah (D4): k. Light grey ware, grey-brown slip, grit temper, diameter unknown; l. Light grey ware, black slip, black grit temper, diameter unknown; m. Dark grey ware, grey-brown slip, grit temper, diameter unknown; n. Cream ware, traces of grey slip, large grit temper; o. Cream ware, green glaze on interior and exterior, grit temper; p. Cream ware, green glaze on interior and rim, grit temper, diameter unknown; q. Cream ware, blue-black glaze on interior and exterior, grit temper, diameter unknown; r. Cream ware, green glaze on interior and rim, grit temper; s. Grey ware, cream slip on exterior, brown paint, grit temper, 0.6 cm thick; t. Cream ware, cream slip on exterior, red-brown paint, grit temper, 0.7 cm thick; u. Cream ware, green glaze on interior and exterior, black underglaze paint, grit temper, 0.4 cm thick; v. Cream ware, light green glaze on interior, grit temper.

Tall Pa-yi Tall (D1): w. Red ware, grey surface on exterior, grey slip on exterior, incised decoration, friable grit temper; x. Green glass; y. Green glass; z. Green glass; aa. Grey ware, brown surfaces, black slip on interior and exterior, grit temper, diameter unknown; bb. Cream-orange-tan ware, grit temper; cc. Dark grey ware, grit temper, diameter unknown; dd. Light grey ware, grit temper; ee. Dark grey ware, incised and punctate decoration, grit temper; ff. Light cream ware, incised decoration, grit temper, 0.6 cm thick; gg. Cream ware, light cream slip on exterior, traces of black slip on interior, grit temper, diameter unknown.

Dowlatabad (D2): hh. Cream ware, black slip, grit temper; ii. Grey ware, grey slip, grit temper; jj. Celadon, light grey ware, light green glaze, diameter unknown; kk. Light cream ware, grit temper; ll. Cream-grey ware, orange-tan slip, incised and punctate decoration, grit temper; mm. Red ware, yellow-brown slip, grit temper; nn. Cream ware, light cream slip on exterior, comb decoration, grit temper, 1.0 cm thick; oo. Cream ware, green glaze on interior, brown underglaze paint, grit temper; pp. Orange-tan ware, green glaze on interior, yellow glaze on exterior, grit temper.



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Figure 76. Ceramics and glass from Dezgah valley. (Scale 1:4.)

Mokhaldon, two farsakhs north of Tashan at the summit of a high steep pass, is a resting place with fine view of both Riz and Dezhgah valleys. There are two dry stone, single-room buildings, each measuring 10×4 m. On a lower ridge is a newly repaired cistern, measuring 25×5 m and with rounded ends.

The Dezhgah valley was visited by Wilson in 1911; his guide was a local official who "pointed out a series of great mounds, some almost as big as those near Shush, and explained that the local name Duzdgah (thieves' place), though not inappropriate, is really a corruption of Dizgah (the place of hill-forts). The people who made those mounds, he opined, lived long before Alexander the Great: they were true *Farsi* – inhabitants of ancient Fars – i.e. original Persians". This opinion was based on the vestiges of irrigation systems and the decline in river level over a measured span of years (Wilson 1942: 179–80).

Tall Pa-yi Tall (D1), is the first of such large mounds encountered in this valley, located directly opposite the point where the track opens onto the plain about one farsakh west of Dezhgah. This high, steep mound, 60×60 m at the top and 12 m high is square, entirely man-made and with a wide moat surrounding the base. No foundations were visible on the surface. Low mounds begin at the base of this mound and extend about one kilometre to the east along the river bank. The ceramics collected from this site (Fig. 75: w–gg) appear to be mainly Sasanian.

Dowlatabad (D2), 500 m south of the village of Dowlatabad in the southeast corner of the valley, is a high square mound, identical to Tall Pa-yi Tall (60×60 m $\times$ 12 m high) and surrounded by a moat. Some baked bricks were found halfway down the slope on the west. A modern fort stands on the top in the southeastern corner. The presence of painted pottery similar to that of Tal-i Pir suggests that the present mound may cover an earlier settlement; otherwise the ceramics suggest a Sasanian–early Islamic occupation (Fig. 75: hh–pp). Low, subsidiary mounds extend to the south and east for about 500 m.

Sheikh Mohammad (D3) is the name of a small tomb in the middle of a cemetery 200 m west of Dowlatabad. In plan the tomb is similar to a *chahār tāq*, with the four corner piers revealing the springings of arches connecting them, presumably supporting a dome. The pillars are in fact hollow and contain domed crypts; the preserved height of 1.5 m shows the plaster floor of the upper crypts. The vague indication of a *mihirāb* can be traced on the south wall.

Sheikh Abdullah (D4), on the northwestern side of the valley on the west bank of the Karakuch River, is a low mound, 50 m across, directly in front of the village of Gori. A much-decayed fort sits on top of

the mound. The ceramics suggest a superposition of a middle Islamic occupation over Sasanian (Fig. 75: k–v).

Tul-i Charmu (D7) is a long limestone ridge extending from the river almost to the mountains, one km south of Gori. The westernmost part of this ridge forms the core of a low mound measuring 300×40 m $\times$ 3 m high. On the top are some plaster and rubble foundations partially cut into the rock. On the slopes, we found a concentration of painted sherds similar to those at Tal-i Pir and comparable to Middle Susiana wares. Worked flints were also found. On the western end of the limestone ridge, at a place called *Obad*, were two "fire pits" and an astodan cut into the stone surface.

Tul-i Gori (D5), one km north of the village of Gori, is a third mound of the Tall Pa-yi Tall type (these mounds thus being located at the ends and angle of this "L"-shaped valley). This mound is 75×70 m at the top, 12 m high, and has a moat surrounding the base (Fig. 75: a–e). It was first described as Tal-i Gabri by Vanden Berghe (1961: 171), who also saw vestiges of an ancient bridge on the nearby river. Low mounds extend for some 500 m to the west and north.

Tul-i Baba Sani (D6), located northwest of Tul-i Gori at the edge of the area of low mounds, is a large mound, 50×40 m across and 5 m high. On the southeast corner is a modern building made of plaster and stone with two rooms flanking a courtyard. The sherd collections appear to indicate a transitional Sasanian–early Islamic occupation for these ruins.

Dezhgah is a large village around which are low mounds of earlier structures, most of which seem to be fairly recent and associated with a decaying fort nearby. The return route to the Jam valley left Dowlatabad and went by way of the Dar al-Mizan valley.

Qalamdon (D8), one-and-a-half farsakhs from Dowlatabad, is a series of terraces with dry stone walling and similar foundations of structures. In the southern part is a large building with three long rooms, each measuring 12×4 m, with a preserved height of 0.5 m. Similar concentrations of rough dry stone structures, suggesting nomad encampments, continued for the next two farsakhs.

Semangiz is the westernmost village in the long narrow Dar al-Mizan valley. About 500 m east of the village is a large cistern, 40 m², made of *sārūj* and rubble. From here to the village of Damidan (about two kilometres) is a concentration of building foundations along the river bank. Another kilometre to the east is Berku, where it is said that an ancient caravan route connects with Gori, passing a cistern called Abanbar Safid ("white cistern").

Gur Kushi (J30) is a high terrace about two kilometres

into the long gorge behind Berku leaving the Dar al-Mizan valley. There are at least four dry stone structures (one measured 25 m² and another 15 × 5 m) and a cemetery. Ceramics suggest a Sasanian–Early Islamic date for at least part of this occupation.

Payeh, two farsakhs from Berku, is a village with two cisterns on the east side; both are square and measure 40 m across.

Maku, located one kilometre south of the village, is a ridge with four buildings, made of plaster and rubble (one measured 14 × 4 m, and another 7 × 4 m; preserved height 1.5 m). A nearby cistern measuring 16 × 4 m with rounded ends, had a newly repaired vaulted roof. Directly below the village is a mill of the “Norse” type, 4 m in height.

Khengak, a deep gorge about two farsakhs from Velayat in the Jam valley, has an extensive system of conduits for the palm groves within the gorge.

Summary

The preceding description of the archaeological remains of the region behind Siraf has introduced elements of repetition and patterning. We shall now outline some of the patterns, into which the data may be organised.

(a) *Trade routes*. According to present-day donkey drivers, the optimal route for transporting goods, especially in summer, should have a watering place every farsakh, i.e. after each hour of travelling time. While neither individual men nor animals need water this frequently, such a system is necessary for supporting caravans of fifty or more animals. The cistern is thus a key feature along any well-travelled route. A tentative typology of cisterns according to form may be suggested. The routes between Taheri and Jam and Galehdar have cisterns exclusively of the form with long parallel sides, rounded ends, generally 14–20 m long and 4 m wide: very similar, in fact, to the cistern at Siraf. The depth below the surface was probably at least three metres. Many retain the springing of vaults and probably all were intended to carry a vaulted roof over the entire length, as in the best preserved example, Sar Gachinu (G2). At Maku, the virtues of this type of cistern were demonstrated to us by the availability of sweet, cold, fresh water. This form of cistern was already current in Sirafi times (see p. 23), the most probable period of extensive utilisation and structural development along these routes. A second type of cistern is the round basin, possibly not roofed, which is always associated with mills, as at Mir Mo’ama (J19) and Berkeh Tul-i Qaleh (J28).

Both examples have semicircular buttresses, as do

a few of the long type. This style of buttress occurs at Siraf and is commonly found on buildings along the routes and in the valleys of Jam and Galehdar; it never occurs north of the Jam valley, suggesting that this was the limit of the influence of Sirafi masons or their building programmes. The semicircular buttress is provisionally taken as a diagnostic of relatively early Sirafi architecture (Whitehouse 1972a). Two further types of cisterns, the oval and large square forms, both seem to be associated with somewhat later architectural complexes (see, e.g. p. 90). All the cisterns are made of rubble and *sārūj*.

The cisterns along the routes rarely stand alone but are associated with various types of subsidiary buildings. The simplest and most common are one- and two-room buildings, generally either 4 m × 10 m or 9 m × 10 m. All of these structures were made of plaster and rubble and had vaulted roofs. Those examples with vaulting still extant show a semicircular arch in section rather than a pointed vault. One end of these buildings appear to have been left open, so in fact they were small *iwans*, many open to the south, although the orientation is far from consistent. A second and rarer type of building is a tripartite structure (called *talar o tarhaneh*), found at Gardan-i Kalat, Tul-i Azizi (?) and Qalamdon, each with three parallel *iwans* or a central *ivan* opening on to two flanking rooms.

More complicated structures have been described here as caravanserais. These fall into two broad categories: the courtyard type, with vaulted rooms along three or four walls; and an *ivan* type, with a series of vaulted rooms opening towards one direction. The *ivan* type is oriented to the south in the two examples found, Sar Gachinu (G2) and Lavar Deh (G15). On the other hand, five examples of the courtyard type have been found, God-i Ibrahim, Gur Kushi (J30), Yod Kusht (G1), Shalo (G4), and Lavar Deh (G15). The majority of these larger buildings are found on the Galehdar route; this route also has structures with both semicircular and square buttresses (the later form of buttress found at Siraf, see Whitehouse 1972a). Together these indications hint at a different usage for the Galehdar route and over a longer period of time. The normal distance between centres of population in these mountains is one day’s travelling time; in other words, there is no valley more than a day’s journey from the next valley. All the caravanserais are placed either at half-way points or within one farsakh of the destinations. They would have afforded only temporary shelter for small groups of individuals rather than large caravans, and presumably they were used by late starters unable to arrive in the next valley by sunset.

(b) *The Jam valley*. The two major sites in the valley

are Minareh (J1) and Bid-i Khar (J31): according to local tradition the ancient cities of Baharistan and Negaristan. Both had glass factories. At Tul-i Khan is a typical Sirafi building: a single long room, generally 4×16 m, with semicircular buttresses and entrances along one side (Fig. 70). Such buildings have been found also at God-i Ibrahim and Khaneh Kal.

In contrast to these open settlements are the high fortified hill tops; Qaleh Si Savaron (J15, J26), Kalatu, Tul-i Qaleh (J7, J8), probably have a Sirafi occupation. Each of these was a fortified centre with Sirafi irrigation works in the immediate vicinities, Bagh-i Qaleh (J10), Tul-i Qaleh Pa'in (J8). A third type of settlement is the open cluster of houses, made of dry stone or, more rarely, plaster and rubble, such as Do Lengeh (J12, J13), Fal Goveh (J4, J5), Nargesi (J3) and Chaheh (J16). These appear to have been small farming communities dating to a variety of periods including the Sirafi. It is this type of settlement which is most dominant to the west of the Jam valley and to the north.

(c) *The Galehdar valley.* It must be emphasised that only a very small portion of this large valley was investigated. No Sirafi buildings were found. The major site is the area of extensive ruins called Kuhl-i Shekak (G7); a similar area is said to exist further down the valley to the east at Fal. The fortified hill tops appear to be non-Sirafi in date; most of these sites, especially Kalat-i Kogan (G5) and the similar Qaleh Si Savaron (J15, J26) near Jam, are essentially places of refuge. The mounds of Shaldun (G10) and Tumb-i Pudu (G13) were probably defensive settlements, but they lack the size and building foundations of the similar mounds of the Jam valley. This un-Sirafi character of the Galehdar valley is surprising, given the ruins along its route, and the possibility of a major Sirafi settlement further down the valley, as suggested by Stein 1937: 217, 221.

(d) *The routes to the west and north of Jam and the valley of Dezhgah.* As mentioned above, there are no Sirafi remains along the routes further inland, with the exception of the long round ended cisterns. While the Riz valley may produce some Sirafi antiquities, the route to Jam is little used. The more used and more natural route connects this valley with Dayyer (a coastal settlement, 40 km west of Taheri). The general lack of sites along the northern route is more surprising and we have two possible explanations: either the present route differs substantially from the ancient one, or, more likely, the route beyond Jam was not under the jurisdiction or at least the direct concern of the Sirafi merchants and was never developed to the same extent.

The valley of Dezhgah is a natural meeting point for the routes to the north. The settlement here is quite

different in character due to the lack of stone and the almost exclusive use of mud brick; the valley is also blessed with a perennial river with sweet water. The three corners of the valley were controlled by high square mounds (D1, D2, D5), each surrounded by a moat and a subsidiary settlement. Whether these mounds were functionally similar to those of the Jam valley must remain an open question; from a preliminary analysis of the ceramics, their period seems to be Sirafi or earlier. The low mounds of Sheikh Abdullah (D4) and Dezhgah itself appear to be later.

Conclusions

As will be readily evident to those familiar with the length of the archaeological sequence in southern Iran, the results of the survey have produced a very uneven picture of human settlement in the land behind Siraf. The evidence of more remote prehistoric periods (at Tombi-i Tir and Tomb-i Pudi in the Galehdar valley) amplifies the pioneering discoveries of Stein; Tul-i Charmu and Dowlatabad establish the existence of prehistoric occupation in the valley of Dezhgah. Although the Jam valley produced no prehistoric pottery, lithic evidence was abundant in several areas – Minareh, Chah Talkhu, Tul-i Cheghoseh and Tul-i Bard. Unfortunately, the caves we investigated were either sterile or had been occupied during much later times, with the result that any trace of earlier occupation was obscured.

It is a long chronological leap from prehistory to the other archaeological material recovered during the survey: that of the Sasanian and Islamic periods. To be sure, further analysis of our collections and further survey work may reveal earlier historic occupations in this region. Nevertheless, the abundance of archaeological sites datable to the millennium between 500 and 1500 poses an interesting historical and archaeological problem, the solution for which almost certainly lies in the port of Siraf. It would appear that, as a broad generalisation, intensive, permanent settlement in the southern folds of this mountainous region depended on the existence of an economic focus on the littoral of the Persian Gulf.

Indeed, the archaeological history of the hinterland reproduces the pattern revealed at Siraf itself. First is the Sasanian occupation, the archaeology of which is nebulous (see pp. 9–12, 98–101) and in its later stages difficult to distinguish from a transitional Sasanian-early Islamic occupation (lasting until the end of the end of the eighth century). The period of Siraf's commercial greatness and economic predominance was between about A.D. 800 and 1050, termed the

Early Islamic or, in this study, the Sirafi period. Occupation continued at Siraf on a greatly reduced scale until the sixteenth century, a period designated middle Islamic here.

Up to this point, the only criteria presented for dating the sites encountered during the survey have been architectural, and traditionally these are the only criteria used for historic sites in regional surveys of southern Iran. However, arguments based solely on such evidence are unnecessarily weakened ignoring that difficult, but exceedingly useful category of material: the pottery found on the surface. Surface collections were made throughout the survey and in Table 3b we present the archaeological sites in terms of the chronological periods to which the pottery is attributed. This is intended as a preliminary and perhaps incomplete indication of the periods of occupation. Those sites placed in transitional positions often had too few diagnostic sherds to permit further classification. The order of sites is based on their occurrence in the descriptions. In addition, Figs. 74, 75 and 76 illustrate the range of ceramic assemblages collected. Fig. 74 shows pottery from Tul-i Shisheh (J31), Minareh (J1), and Baba Mobarak (J6) in the Jam valley and Kalat-i Kogan (G5) in the Galehdar valley. Fig. 75 continues the material from the Galehdar valley with the sites of Kuh-i Shekak (G7), Shaldun (G10), Chah Mo'avan I (G8) and II (G9), and Tumb-i Pir Mardi (G14). Finally Fig. 76 presents a selection of ceramics from the Dezhgah valley: specifically from Tall-i Gori (D5), Sheikh Abdullah (D4), Tall Pa-yi Tall (D1) and Dowlatabad (D2), with the site of Tumb-i Hamam, Riz (J29).

Because of the methodological limitations of the survey data, due to shortage of time, difficulty of travel and the lack of established ceramic comparanda, we shall not attempt a detailed discussion of settlement patterns and regional development. The publication of the ceramics from Siraf should provide the chronological indicators necessary for re-analysis of these assemblages. However, our corpus of archaeological sites may be taken as a representative sample of the sites in this region, and we hope it will serve as the basis for future studies, when more systematic collecting may be combined with geographical studies of, for example, agricultural and resource potentials, as in the immediate hinterland of Siraf (see pp. 60–74).

There remains to be considered, however, the question of the broader significance of the survey of the high valleys, the cultural context to be inferred from the list of sites and their chronological position. The port of Siraf, like most ancient and, to some extent, modern ports on the Iranian side of the Persian Gulf,

<i>List of Sites (in order of presentation)</i>	<i>Code Number</i>	Collections	
		pottery	flint
Tul-i Azizi	-	-	-
Bard-i Pahan	-	-	-
Gardan-i Kalat	-	-	-
Kohru	-	-	-
God-i Ibrahim	-	-	-
God-i Ibrahim Pa'in	-	-	-
Berkeh Deseri	-	-	-
Bard-i Neveshta	-	-	-
Hermi (Hermi Bash)	J20	-	-
Padri	J21	-	-
Kuh-i Padri	-	-	-
God-i Sal be Kuh	J22	-	-
Minareh	J1	X	X
Bohreh Hajji Noshod	J2	-	-
Bohreh Bagh	J32	X	-
Bid-i Khar	-	-	-
Tul-i Shisheh	J31	X	-
Kalatu	-	-	-
Do Lengeh	J12, 13	X	-
Qaleh Si Savaron	J15, 26	-	-
Khaneh Kal	J14, 25	-	-
Shekaftah Tabarkan	J27	X	-
Qabr Turkeh	J24	-	-
Chah Talkhu	J23	-	X
Chaheh	J16	X	-
Tul-i Bard	J17	-	X
Sineh Zazi	J18	X	X
Mir Mo'ama	J19	-	-
Sar Riz	-	-	-
Tul-i Cheghoseh	J11	X	X
Bagh-i Qaleh	J10	-	-
Nargesi	J3	-	-
Fal Goveh	J4, 5	-	-
Tul-i Baba Mobarak	J6	X	-
Tul-i Qaleh	J7, 8	-	-
Imamzadeh Shah Mohammad	J9	-	-
Berkeh Tul-i Qaleh	J28	-	-
Khaneh Qaleh	-	-	-
Gardaneh Parchehgah	-	-	-
Molvard	-	-	-
Shahr-i Khas	-	-	-
Khibitu	-	-	-
Tumb-i Hamam	J29	X	-

Table 3a. List of sites.

Sasanian (4th–6th)	Sasanian– Early Islamic (7th–8th)	Early Islamic (9th–12th)	Middle Islamic (13th–15th)	drawing figures
JAM VALLEY				
Do Lengeh (J12)				
	Tul-i Baba Mobarak (J6)			74: y–z
	Tumb-i Hamam (J29)			76: f–j
		Minareh (J1)		74: s–x
		Sineh Zazi (J18)		
		Shekafteh Tabarkan (J27)		
		Tul-i Shisheh (J31)		74: a–r
		Bohreh Bagh (J32)		
GALEHDAR VALLEY				
Kalat-i Kogan (G5)				
		Yod Kusht (G1)		74: aa–ee
		Lavar Gol (G3)		
		Chah Mo’avan I (G8)		75: w–bb
			Sar Gachinu (G2)	
			Kuh Shekak (G7)	75: a–o
			Chah Mo’avan II (G9)	75: cc–ii
			Shaldun (G10)	75: p–v
			Tumb-i Pir Mardi	75: jj–mm
DEZHGAH VALLEY				
Tall Pa-yi Tall (D1)				
			Sheikh Abdullah	76: w–gg
				76: k–v
				76: a–e
	Tul-i Baba Sani (D6)			
		Dowlatabad (D2)		76: hh–pp
		Qalamdon (D8)		
		Gur Kushi (J30)		

Table 3b. Chronological periods of sites with ceramics.

was a precarious, almost “colonial” venture, supported by cities in the interior, in this case Firuzabad (Gur) and Shiraz. Once a port ceased to be simply a small fishing village inhabited by the coastal population (historically Arab), its social and economic structure took a quantum leap to an order of complexity which resulted from (and was only supportable by) involvement in long-range trade and by a parasitic relationship with at least one urban centre in the hinterland. This was due to the fact that, in economic terms, there was no regional infrastructure of settlements which could give rise naturally to the port as a regional centre; instead the port as an urban entity was an artificial implantation, becoming a nexus round which a regional settlement system subsequently developed.

Thus the port of Siraf had special relationships with its regional settlements and, vice-versa, the focus for regional settlement was an entrepot for long

distance trade. Consequently, a system of rural centres of production developed, which contributed to the support of the port; their products included water, grain, fruits (citrus and dates), livestock (mountain herding) and manufactured goods, especially perfumes (and glass containers), textiles, etc. The climatic dichotomy between the torrid coast and the more temperate interior also suggests that an important function of the mountainous region was to serve as an escape mechanism during the hot and humid summers, both for health reasons and, to the extent that the mercantile population was Iranian, as a socio-psychological identification with the highland culture and geography. While the richest merchants of Siraf retreated to their homes in Shiraz (see p. 101), we may surmise that many of the less affluent spent the summer in the valleys of Jam and Galehdar.

Settlements thus reflect commercial transit support

mechanism (e.g., road maintenance and security, organisation and feeding of transport animals and their human agents), agricultural-cum-light manufacturing communities, and seasonal residential facilities. As suggested above, the sequence of development in the settlement of the Siraf region should, in broad terms, follow the shifting patterns of a dendritic system towards a nesting hexagonal system of settlement location (cf. Whitcomb 1979).

The two patterns are reflected in the valleys examined in this survey. Within each valley, the settlements formed important transport support centres, linking Siraf with the interior. The valley of Jam assumed a primacy in this role while Siraf was the predominant entrepot in the Persian Gulf, between the ninth and the eleventh centuries. Production and residential activities were important secondary functions. The valley of Galehdar in contrast seems more strongly oriented toward these latter functions at a later date (thirteenth to fifteenth centuries). Thus, although Galehdar continued to be linked with a now smaller, less important Siraf by a well-developed caravan route, the centre of its cultural context was Fal (Khunj-o-Fal) farther east and unfortunately not

included in the present survey (Gaube 1980). Aubin (1969: 24–25) showed that the history of Fal is that of a regional centre of religion and learning, an “urban” settlement complex within the mountains of southern Fars closely associated with the capital, Shiraz, and with commercial linkages with Siraf and other ports as secondary functions. It is interesting to note that in the early 1970s, the Shi’ite mullah of Taheri told us that he regarded the mullah of Fal as his spiritual counsellor and that the latter was asked to approve marriages contracted in Taheri.

Without further archaeological and geographical research in the region, these suggestions for the analysis of the development of the land behind Siraf must remain at the level of hypothesis. Nevertheless, the survey described here created an archaeological context for Siraf and demonstrated that the understanding of the economic and social organisation of the port is intimately connected with regional (and macro-regional or provincial) functions. The further delineation of the functioned elements implicit in the highland ruins of the Jam, Galehdar, and Dezhgah valleys will greatly expand the significance of Siraf for the historical development or medieval southern Iran.

Chapter 6

The Wider Context

Early Islamic Siraf flourished, despite the hardships imposed by torrid summers, little rain and poor soil. Residents invested their wealth in houses, the congregational mosque and other mosques, the expansion of agricultural productivity by irrigation, and the construction of roads to the hinterland. Food that could not be grown in the immediate vicinity was imported from Jam and Galehdar, and possibly from abroad. Even before one allows for investment in real estate elsewhere and in ships and other moveable property, it is clear that the city was rich. The principal source of this wealth was overseas trade. Siraf was a highly successful entrepot for oriental and African goods destined for markets in Western Asia. Sirafi carriers made fortunes by importing raw materials (e.g. timber) and manufactured goods (e.g. silk) from Africa, India and the Far East. They accomplished this by making themselves first a major economic force in the Indian Ocean and later by extending their reach to China.

The Indian Ocean is a vast body of water, which covers more than 70 million km² and extends from Africa to Australia and from Asia to Antarctica. In the west, the Red Sea stretches almost to the Mediterranean and in the east the Strait of Malacca provides access to the China Sea. Geographically, oceans separate landmasses and their inhabitants; culturally, however, they unite them, as soon as the desire to communicate exists and people have the ability to navigate long distances with acceptable levels of safety and economy.

Chaudhuri (1985: 34–62) recognised two successive patterns of trade in the Indian Ocean between the advent of Islam and the arrival of the Portuguese.

In the later pattern, most merchants confined their activities to one of three smaller, regional networks: in the Arabian Sea, in India and Malaysia and in Southeast Asia and China. The earlier pattern, which ended in the tenth century, was dominated by a handful of cities, which invested in long-distance trade all over the Indian Ocean and beyond; one of these cities was Siraf.

The Sasanian Period

Fiorani Piacentini (1992) stated the case for regarding Sasanian Siraf as a naval base, strategically placed at the end of the route from Gur/Firuzabad to the coast. This assessment is probably correct, but incomplete, and here we explore the hypothesis that the Sasanian community also engaged in trade. The argument runs as follows: in (and probably before) the sixth century, Sasanians played a prominent role in the seaborne trade of the Arabian Sea. Siraf was uniquely placed to supply the Sasanian city of Gur with imported goods and a priori, therefore, one might expect that it participated in the trade; in fact, imported objects occur at Siraf (see pp. 8, 100–101).

The Roman historian Ammianus Marcellinus (22.6.11), writing in the fourth century A.D., noted the volume of shipping in the Persian Gulf. In the fifth century, Sasanian interest in maritime trade may have increased when Bahram V (r. 421–38) married an Indian princess and received as part of the dowry the city of Daibal, which is usually identified with the site of Banbhore, 55 km from Karachi, where excavations have revealed the remains of a pre-Islamic and early

Islamic port (Fig. 77; see below, p. 112). Later, during the reign of Khusrav I Anusharvan (r. 531–578/9), the Sasanians controlled Aden and had a sufficiently strong presence in Sri Lanka, so Procopius (*Wars* 1.20.12) complained, to monopolise the market in silk (Ricks 1970: 342–43; Whitehouse and Williamson 1973: 44). At the same time (evidently between 547 and 553), Cosmas Indicopleustes (1968: 3.65) described Sri Lanka as the meeting place of two trading networks: “Many ships come to this island from all India, Persia and Ethiopia.... From the farther regions – I refer to *Tsinista* [China] and other places of export – the imports of Sri Lanka are silk, aloes, cloves, sandalwood, and so forth ... [which are passed on] to Persia, *Homerite* [in Yemen] and *Adoulis* [in Ethiopia]”. Cosmas also noted the presence of communities of Nestorian Christians on Sri Lanka and at two places on the west coast of India, but stated that he did not know of any churches farther afield.

It is just possible, however, that merchants from the Persian Gulf occasionally ventured beyond Sri Lanka.

Several Arab historians noted the presence of “Chinese ships” (*sufun min al-Sin* or *sufun siniyya*) in the Persian Gulf at the time of the Muslim conquest, while Chinese sources refer to a people and a place known as *Possu*, which is often taken to mean southern Iran (Fars). Thus we read about Possu products in the fourth or fifth century, and Possu ships in Chinese waters in the seventh and eighth centuries; for example, Possu ships took part in the raid on Guangzhou in 758 (Hourani 1995: 46–50). Unfortunately, neither body of evidence is conclusive. It is not clear whether the Arabic phrases – they are as tantalising as the English “China ships” – refer to Chinese ships, ships that sailed to China or ships that carried Chinese merchandise, and the identity of the Possu is far from certain. Some Possu products, such as cumin and pistachio, could well be Iranian, but Possu also referred to a place in south-east Asia (Wolters 1967: 129–58). According to Zhang (1983: 92), on the other hand, a Chinese source, the *Sung shu* (the history of the Liu-Song Dynasty), Chinese ships visited the Persian Gulf in the fifth century.

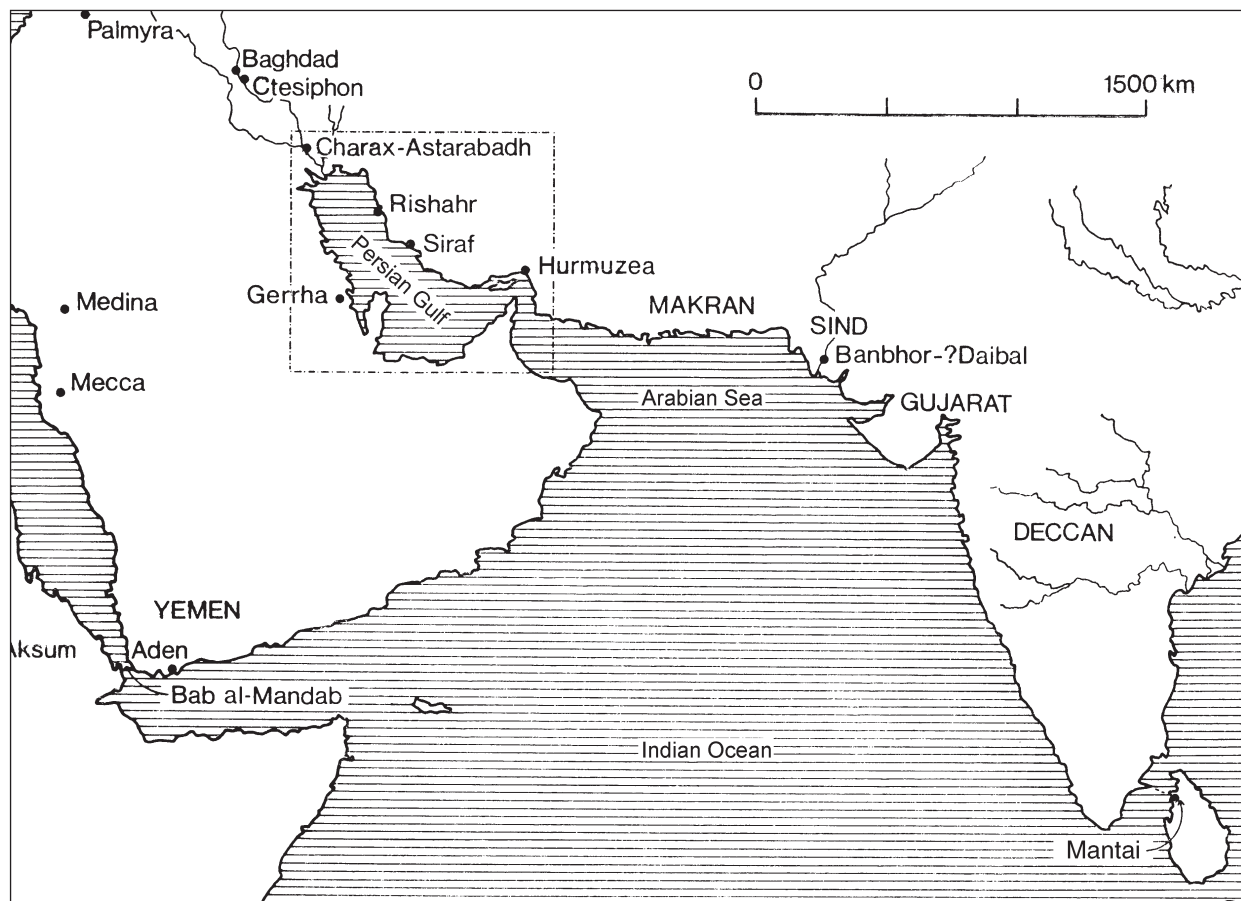


Figure 77. Sites mentioned on pp. 98–113. The boxed area is enlarged in Fig. 78.

One further hint of Sasanians in eastern Asia exists in the records of the Nestorian church, which had a strong presence in the Persian Gulf (Fig. 78) and churches in India, Sri Lanka and farther east. Ishoyabh III, who was Catholicus from 647 or 650 to 657/8, noted that in his day the Metropolitan of Rev Ardashir (which was on or near the Persian Gulf, probably near Bushehr) was responsible for the churches of India. In this context, India referred to a region extending “from the maritime borders of the Sasanian kingdom to the country called QLH, which is a distance of 1200 farsakhs.” (A farsakh is the distance one can travel in an hour.) It is probable that the Syriac QLH was the same place as Arabic Qal’a, sc. an entrepot on the

Malay Peninsula. If this is correct, some westerners did venture east of Sri Lanka and the existence of a church at Qal’a suggests permanent residents, presumably merchants as well as a priest (Colless 1969: 20–21).

Given the existence at Siraf of a Sasanian settlement within relatively easy reach of Gur, it is unlikely that it was not a participant in the network of maritime trade, which in the sixth century extended from Aden to Sri Lanka. Indeed, we know that another Sasanian settlement in Fars, Qasr-i Abu Nasr near Shiraz, obtained objects (including cowrie shells) from beyond the Persian Gulf (Whitcomb 1985: 186).

The evidence from Siraf itself is as follows. Apart from a coin of the Roman emperor Theodosius I

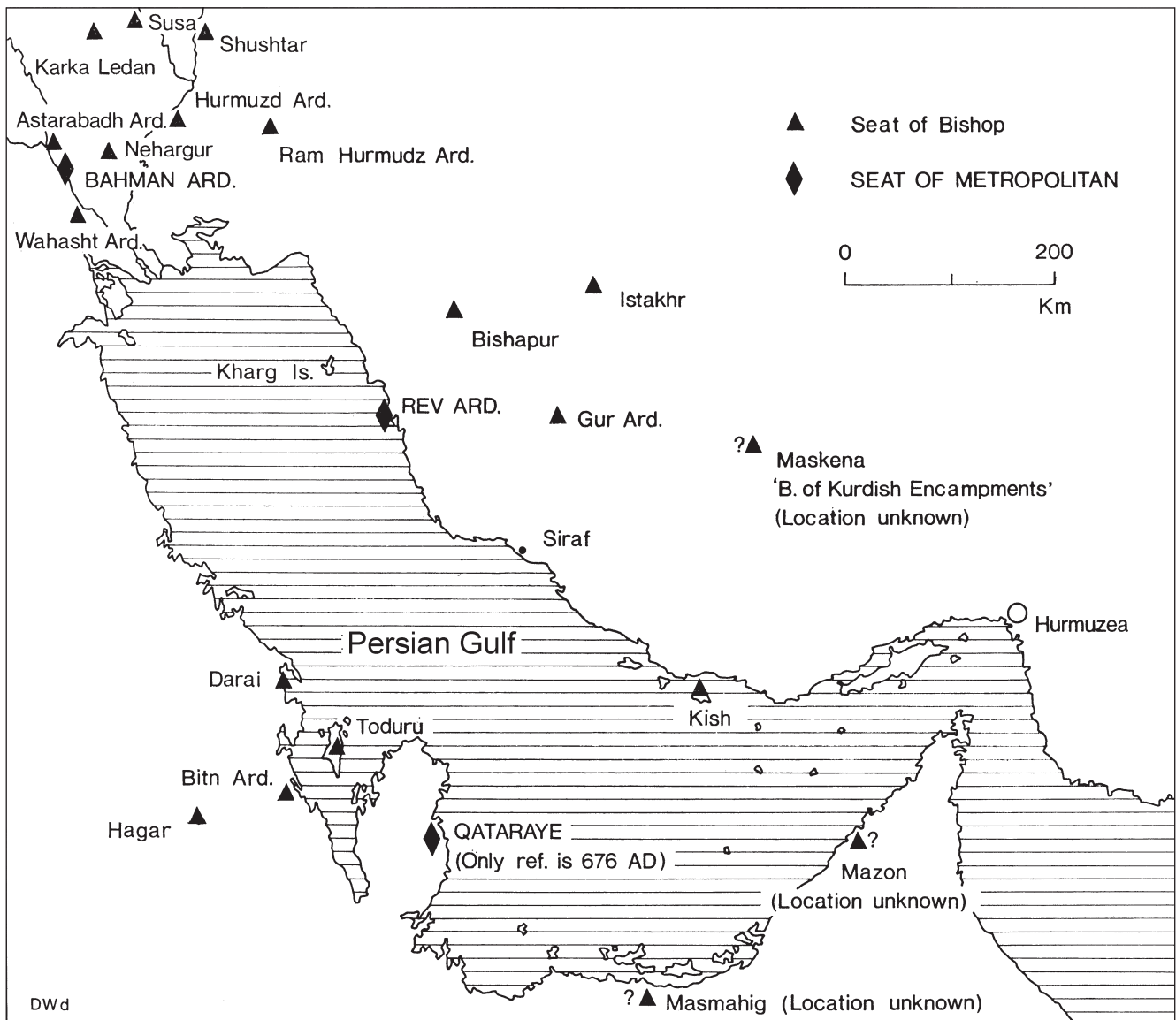


Figure 78. Nestorian churches in and near the Persian Gulf.

(r. 376–94), found in a later context (Lowick 1985: 11, no. 2), the excavation yielded rare fragments of painted pottery from the vicinity of Minab and a larger quantity of “Red polished” ware from Gujarat or Sind (Whitehouse and Williamson 1973: 38–39; Whitehouse 1974: 6). Moreover, microscopic examination suggests that the pottery with green glaze found in Sasanian contexts beneath the congregational mosque was made from the same clay as much of the early Islamic green-glazed pottery, which was imported from southern Iraq (Whitehouse 1979: 881; Mason and Keall 1991). The Sasanian community, therefore, imported pottery from Gujarat or Sind (possibly from Daibal) and Minab, and probably from Iraq. It is more likely, we suggest, that these objects arrived by trade than by naval procurement.

Although the fort at Site B (not the small building mentioned by Tampoe 1989: 100) had been reduced to a ruin before the beginning of the ninth century, when the construction of the congregational mosque began, the area was not abandoned. In the outer enclosure, we identified five periods of construction. Throughout these periods, the enclosure retained the same basic plan and occupation appeared to be continuous (Whitehouse 1972a: 70). Period 3 was associated with a light-weight solidus of the Byzantine emperor Constans II, struck at Constantinople in 651–59 (Lowick 1985: 11, no. 3), and periods 4 and 5 yielded lead coins comparable with the coins from the mosque itself. The outer enclosure, therefore, was occupied without a break from the Sasanian period until shortly before the construction of the mosque. Moreover, the earth used to fill the platform, on which the mosque was built, yielded a group of twenty-four complete and fragmentary dirhams, apparently the remains of a hoard disturbed, but not completely salvaged, by the workmen who collected the fill (Whitehouse 1970: 3). The earliest coin was struck in 80/699–700 and the latest in 121/738–39 (Lowick 1985: 16–20, nos. 42, 44–49, 51–55, 58, 59, 61, 62 and 64–72). If the surviving coins are typical of the hoard as a whole, it may have been concealed in the second quarter of the eighth century. It would be rash, therefore, to dismiss the hypothesis of continuous occupation at Siraf, although we know very little about the character and extent of the earliest Islamic settlement. It is worth noting, however, that the earliest Chinese material (forty-six fragments of stoneware jars) was found in period 4 of the outer enclosure; evidently, Siraf was already a participant in, or beneficiary of, long-distance trade before the construction of the mosque in the decades around the year 800.

The Age of Expansion

Siraf was not, of course, alone. When the Portuguese entered the Indian Ocean in 1497, they found a network of traders who regularly visited ports in eastern Africa, western Asia, India, Sri Lanka, Southeast Asia and China. This network had developed over millennia; but in the early Islamic period it expanded dramatically and, for the first time, we read of ships from the Persian Gulf visiting areas as far removed as China and Mozambique. As the home port for ships voyaging to Africa and the Far East, and as an entrepot for goods bound for Iraq and the Iranian plateau, ninth-century Siraf was a leading participant in the largest system of seaborne trade that had ever existed.

Four factors determined the character and development of this network. The first factor was climatic (Yajima 1976). The monsoon, a system of seasonal winds which, in the Arabian Sea, blow from the northwest in summer, thereby providing optimum conditions for sailing quickly from western Asia to India, and from the southeast in winter, ensuring a rapid return. The existence of the monsoon made trans-oceanic voyages relatively easy. Ships left Siraf for India in early summer and they returned six months later. These fixed points in the seasonal calendar cannot have failed to effect the life of the city; and, given the oppressive heat and humidity of Siraf in the summer, the city’s commercial “timetable” was almost ideal. After the departure of the ships, the richer families withdrew to summer houses in the interior (many of them went to Shiraz: see Fiorani Piacentini 1992), leaving the streets empty and the bazaar shuttered.

The second factor was cultural. The Islamic religion spread rapidly in western Asia in the seventh century. Under the impact of Arab expansion, the Byzantine Empire was greatly reduced and the Sasanian Empire collapsed. In 711, an Arab army invaded Sind. Before the end of the eighth century, Muslim settlers had begun to arrive in the coastal towns of eastern Africa. The existence of Islamic communities, linked by a common religion, legal code, and language, encouraged the establishment of regular communications in a large part of the western Indian Ocean.

The third factor was also cultural: the demand for exotic commodities and products in the cities of western Asia, especially Baghdad. One of the reasons for selecting Baghdad as the site of the ‘Abbasid capital in 762, al-Tabari maintained, was its accessibility from the Persian Gulf. “This is the Tigris,” al-Tabari made the caliph observe. “There is no obstacle between us and China; everything on the sea can come to us” (Tabari 1879–93: v. 1, 272).

The last factor was the unification of China under the Tang Dynasty (681–907) and the consequent expansion of China's horizons (Zhang 1983: 92–94, with references). By 748, a large colony of merchants from Western Asia existed on Hainan Island – large enough, indeed, to attack and burn the port of Guangzhou (Hourani 1995: 62–63). Despite these hostilities, however, trade with China flourished for more than a century, until the rebel Huang Ch'au captured Guangzhou in 878 and slaughtered Chinese and foreigners alike. According to Abu Zaid, who presumably inflated the number, the victims included 120,000 foreigners: Muslims, Jews, Christians and Zoroastrians (*ibid.*: 76–77).

The explosive growth of maritime trade in the years around 800 was a by-product of the 'Abbasid revolution. When the 'Abbasids overthrew the last Umayyad caliph in 750, they decided to establish a new capital outside Syria, which was full of Umayyad supporters and alarmingly close to the Byzantine frontier. Iraq was the obvious area to explore and the 'Abbasid caliphs experimented with one site after another. Abu 'l-'Abbas al-Saffah (r. 750–54) first chose Qasr Ibn Hubayra, between Baghdad and Kufa, but in 752 he transferred the court to Anbar on the Euphrates. His successor, al-Mansur (r. 754–75), began a third capital, Hashimiyya, between Kufa and Hira, but this, too, soon was abandoned.

Al-Mansur then travelled the length of the Tigris, looking for a more suitable site (Creswell 1989: 1–38). Eventually, he chose Baghdad on the west bank, at a point where the Tigris and the Euphrates are less than 40 km apart and were connected by a canal. Al-Maqdisi (writing c. 985) told how local inhabitants assured the caliph that, by choosing Baghdad, "you will always be surrounded by palm trees and be near water, so that if one district suffers from drought, or fails to yield its harvest in due season, there will be relief from another; while being on the banks of the al-Sarat [canal] provisions will reach you on boats that ply the Euphrates. The caravans of Egypt and Syria will come by way of the desert, and all kinds of goods will reach you from China by sea, and from the country of the Greeks (i.e. the Byzantine Empire) and Mosul by the Tigris."

Indeed, with the benefit of hindsight, writers praised al-Mansur's choice from a commercial point of view. Ya'qubi (writing in the mid-ninth century) maintained that the caliph selected the site because "the Tigris to the east and the Euphrates to the west are the waterfronts of the world."

The construction of Baghdad began in 762. The nucleus was the "round city," a circular enclosure protected by a double wall, which contained the

palace, the principal mosque, ministries, barracks and élite residential quarters. According to al-Khatib al-Baghdadi, the diameter of the round city was 5,093 cubits, or about 2,640 m. If this figure is correct, its area was 547 ha. At the centre stood the residence of al-Mansur, known as the Palace of the Golden Gate, a square building, 400 cubits (about 208 m) across and 80 cubits (about 42 m) high.

The round city was by no means the only component of 'Abbasid Baghdad. To the south lay al-Karkh, a township, which already existed in 762. To the north was al-Harbiyya, a quarter dominated by the officers of the caliph's army. Across the river lay al-Rusafa (established in 769), al-Shammashiyya and al-Mukharrim.

Despite the scale and reported magnificence of Baghdad, there can be no more vivid index of the wealth available to the 'Abbasids than the city of Samarra: yet another new capital, founded *ex novo*, 120 km upstream of Baghdad. Here, in forty-six years, the Caliph al-Mu'tasim and his successors created a city that sprawled intermittently along the Tigris banks for 35 km.

The most spectacular buildings created at Samarra were, in chronological order:

1. The Jausaq al-Khaqani, al-Mu'tasim's palace, built between 836 and 842
- The Great Mosque, built by al-Mutawakkil in 848/9–852.
3. The Balkuwara Palace, built by al-Mutawakkil between about 849 and 859.
4. The Mosque of Abu Dulaf, also built by al-Mutawakkil, in 860–61.
5. The Qasr al-'Ashiq, al-Mu'tamid's palace, built, built between 878 and 882.

The Jausaq al-Khaqani was the largest building complex of all. Its walls enclosed 175 ha, 71 of which were occupied by gardens along the Tigris. A monumental flight of steps, 60 m wide, ascended from the gardens to the entrance, beyond which stood the nucleus of the palace, some 200 m², containing reception rooms, the caliph's apartments and the harem. Behind this nucleus was a courtyard, 380 m long, with quarters for the caliph's retinue and guards, stables and magazines on either side.

The Caliph al-Wathiq (r. 842–47) consolidated the grandiose foundations laid by al-Mu'tasim. Al-Ya'qubi reported that, thanks to the efforts of al-Wathiq, the people realised that Samarra was intended to be a permanent capital. From this moment, it attracted inhabitants. When therefore, al-Mutawakkil constructed a congregational mosque, he produced a building as impressive in its dimensions as the palaces. The mosque measured 240 by 156 m internally, with a

prayer hall twenty-five bays wide and nine bays deep. Al-Maqdisi reported that it rivalled the great mosque of Damascus (one of the wonders of the Islamic world) and was covered with ornament (including glass mosaics, to judge by the tesserae found by Herzfeld, when he cleared part of the interior: see Lamm 1928: 115–23). Outside the mosque was a free-standing minaret, more than 50 m high.

The scale of these buildings was prodigious: the Jausaq al-Khaqani was larger than Versailles, the Great Mosque was the largest ever built. While size is not necessarily an index of cost or quality, it is a measure of effort. And while the principal building material (sun-dried brick) and labour were cheap, the collective cost of the five buildings just described – not to mention the rest of the city – must have been immense. Whatever the long-term effects of investment on this scale may have been, it is an overwhelming demonstration of the resources of the 'Abbasid caliphate, and the spending-power of Iraq in the ninth century.

Part of this immense spending-power was directed towards acquiring rare and luxurious objects from all over the known world, and ports like Siraf rose to the challenge. For the merchant community, participation in the long-distance trade of the Indian Ocean was hugely profitable. For the individual it was a game of chance. Shipwreck caused ruin; successful voyages brought enormous profit.

The most famous merchant associated with Siraf was Abu 'l-Qasim Ramisht (Stern 1967: 10). In the twelfth century, an anonymous writer added the following note to the description of Siraf in Ibn Hauqal's history: "[Siraf's] inhabitants are very rich. I was told that one of them, feeling ill, made his will; the third part of his fortune, which he had in cash, amounted to a million dinars, not counting the capital which he laid out to people who undertook to trade with it on commenda basis. Then there is Ramisht, whose son Musa I met in Aden in the year 539 [1144–45]; he told me that the silver plate used by him was, when weighed, found to be at least 1,200 manns [about 13,680 kg, if we take one mann to be the equivalent of about 25 pounds or 11.4 kg]! Musa is the youngest of his sons and he has the least merchandise. Ramisht has four servants, each of which is said to be richer than his son Musa. I have met 'Ali al-Nili from the countryside of al-Hilla, Ramisht's clerk, and he told me that when he came back from China twenty years before, his merchandise was worth half a million dinars; if that is the wealth of his clerk, what will he himself be worth! It was Ramisht who removed the silver water-spout from the Ka'ba and replaced it with a golden one, and also covered the Ka'ba with Chinese cloth, the value of which cannot be estimated.

I have heard of no merchant in our time who equalled Ramisht in wealth or prestige."

Other writers provide further information about Ramisht and his benefactions. Al-Fasi (775–832/1373–1429) recorded that the golden water-spout was delivered in 537/1142–43 by Ramisht's servant Mithqal, together with his coffin, after his master's death. Both al-Fasi and Ibn al-Athir provide information about the cloth. Writing about the events of the year 532/1137–38, Ibn al-Athir reported: "In this year the cover of the Ka'ba was torn in the course of the dissent mentioned above. [In fact, no dissent was mentioned and Stern was unable to find any reference to disturbances.] Ramisht the merchant of Fars undertook to provide a new cover. He used for it the most precious material he could lay hands on, so that it cost him 18,000 Egyptian dinars." Al-Fasi, on the other hand, stated that Ramisht covered the Ka'ba with "striped cloth and other material. This cost him 18,000 dinars according to Ibn al-Athir; according to others, it cost him 4,000 dinars" (Stern 1967: 11–13).

The written evidence and finds made during the excavation, provide a glimpse of some of the merchandise that passed through the Siraf. The written sources (noted on p. 13) refer to imports from China (paper), southeastern Asia (aloes, camphor, and sandalwood), India (perfumes, drugs, and spices), Sri Lanka (gemstones), and eastern Africa (ivory). The most conspicuous imported items found in the excavation were Chinese ceramics (Figs 79 and 81–85). The earliest examples were sealed beneath the platform of the congregational mosque. They consisted of a few sherds from large stoneware jars with olive-green glaze and smaller jars with a black surface. The first type is known as a "Dusun" jar, after the Dusun people of Sabah in North Borneo, who collect them today. The most exciting Dusun jar from Siraf, which was broken and discarded in the ninth century, bears two Arabic names scratched on the pot before it was fired (Whitehouse 1970: 5). The jar is undoubtedly Chinese and so the names were written in China. We assume that it was made to order for Muslim merchants living there.

By about the year 800, when the original platform of the mosque was filled with earth, Chinese stoneware bowls decorated with rosettes and other motifs painted in brown and green were plentiful (Fig. 80). Indeed, their wide distribution in the Persian Gulf and around the shores of the Arabian Sea shows that they appealed to a large market. The bowls were made in the Ch'ang-sha region of Hunan in southern China. The same region also produced ewers and jars decorated with moulded appliqué and these, too, are found at Siraf (Fig. 81).

Later in the ninth century, merchants began to import at least two other varieties of Chinese ceramics: plain white ware and green stoneware. The earliest white ware consists of coarse stoneware bowls, the interiors of which may have radiating ribs, with corresponding notches in the rims. In the late ninth or



Figure 79. Grey stoneware bowl.

early tenth centuries, these were replaced by bowls of translucent white porcelain (Fig. 82). Green stoneware was equally popular. The latter includes bowls with patches of glaze scraped from the interior or rings of stacking scars on the interior and on the foot (Fig. 83). A handful of sherds have incised ornament of the type associated with kilns at Sh'ang-lin-hu in Chekiang. Among the finest Chinese ceramics from Siraf is a lobed dish decorated in relief with birds in flight (Fig. 84). The dish is made of white porcelain and the colourless glaze is enlivened with patches of green (Whitehouse 1972a: 74). Several of these varieties of Chinese ceramics also occur, but in much smaller quantities, at Sohar and other sites in Persian Gulf and the Gulf of Oman (Rougeulle 1991).

The Pattern of Trade

We know far too little about the ships that sailed from Siraf. However, in one of the buildings in the palace at Site K, we found a graffito of a three-masted vessel (Fig. 85; Whitehouse 1972a: 7). The graffito was buried by debris from the collapse of the building and we are confident that it dates from the tenth or eleventh century. Modern two-masted dhows draw about 240 tonnes and require crews of thirty. The three-master depicted in the palace was significantly larger. Medieval writers mention crews of 200 or more and, even after making allowance for exaggeration (as perhaps in the story repeated on p. 111), it is clear

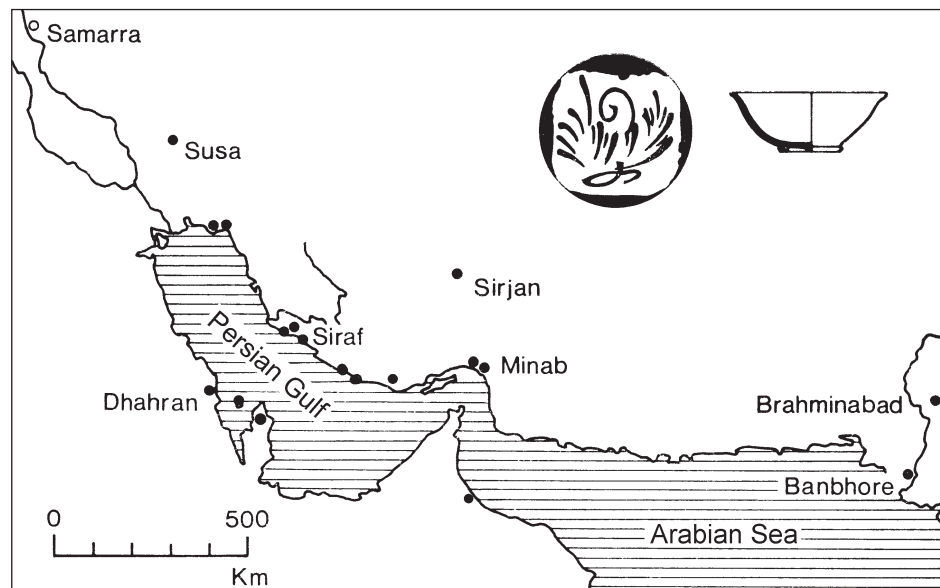


Figure 80. The distribution of Painted Stoneware in Sind and the Persian Gulf. Inset: a typical Painted Stoneware bowl from Kudus in Java (Van Orsoy de Flines 1969: pl. 9).



Figure 81. Brown-glazed stoneware jar.



Figure 82. White porcelain bowl with moulded decoration and green dots.



Figure 83. Detail of Figure 82.

that the largest vessels drew several hundred tonnes. Given their size, the construction of these vessels was extraordinary (Moreland 1939). The hulls were carvel-built (that is, the planks were flush rather than overlapping) and, in the words of Vasco da Gama, they were "held together with cords." Throughout the western Indian Ocean, nail-fastened ships, like those of medieval Europe and China, were unknown. Thus at Malindi in eastern Africa, in 1500, Pedro Alvares Cabral found ships which were "stitched with cords." Shortly afterwards, Duarte Barbosa reported the presence of stitched vessels on the Malabar coast of India; and both Marco Polo (in the late thirteenth century) and Odoric of Pordenone (about 1320) described seeing them at Hormuz. Indeed, from the time of the *Periplus of the Erythraean Sea* (which was probably written in the first century A.D.), we have numerous references to ships in the Arabian Sea that were held together – literally – with twine, and not a single mention of hulls that were fastened with nails.

Most of these ships were built in their home ports

with timber imported from India. Abu Zaid, however, described how the Omanis built ships on the Maldive Islands in the middle of the Indian Ocean: "[They] cross over to the islands that produce the coconut, carrying with them carpenters' and such-like tools; having felled as much wood as they want, they let it dry, then strip off the leaves, and with the bark, they spin a yarn, with which they sew the planks together, and so build a ship. Of the same wood, they cut and round away a mast; of the leaves they weave their sails, and the bark they make into cordage. Having thus completed their vessel, they load her with coconuts ... which they sell in Oman" (Hourani 1995: 91).

The beginning and the end of many long-distance journeys in the Indian Ocean was Basra in southern Iraq. Basra had been founded as a new city in 16/637–38. It grew rapidly and became a great river port connected by canals with the Shatt al-'Arab (the single mouth of the Tigris and the Euphrates); in effect, it was the gateway between the Indian Ocean and Baghdad. In 871, however, Basra was sacked during an uprising

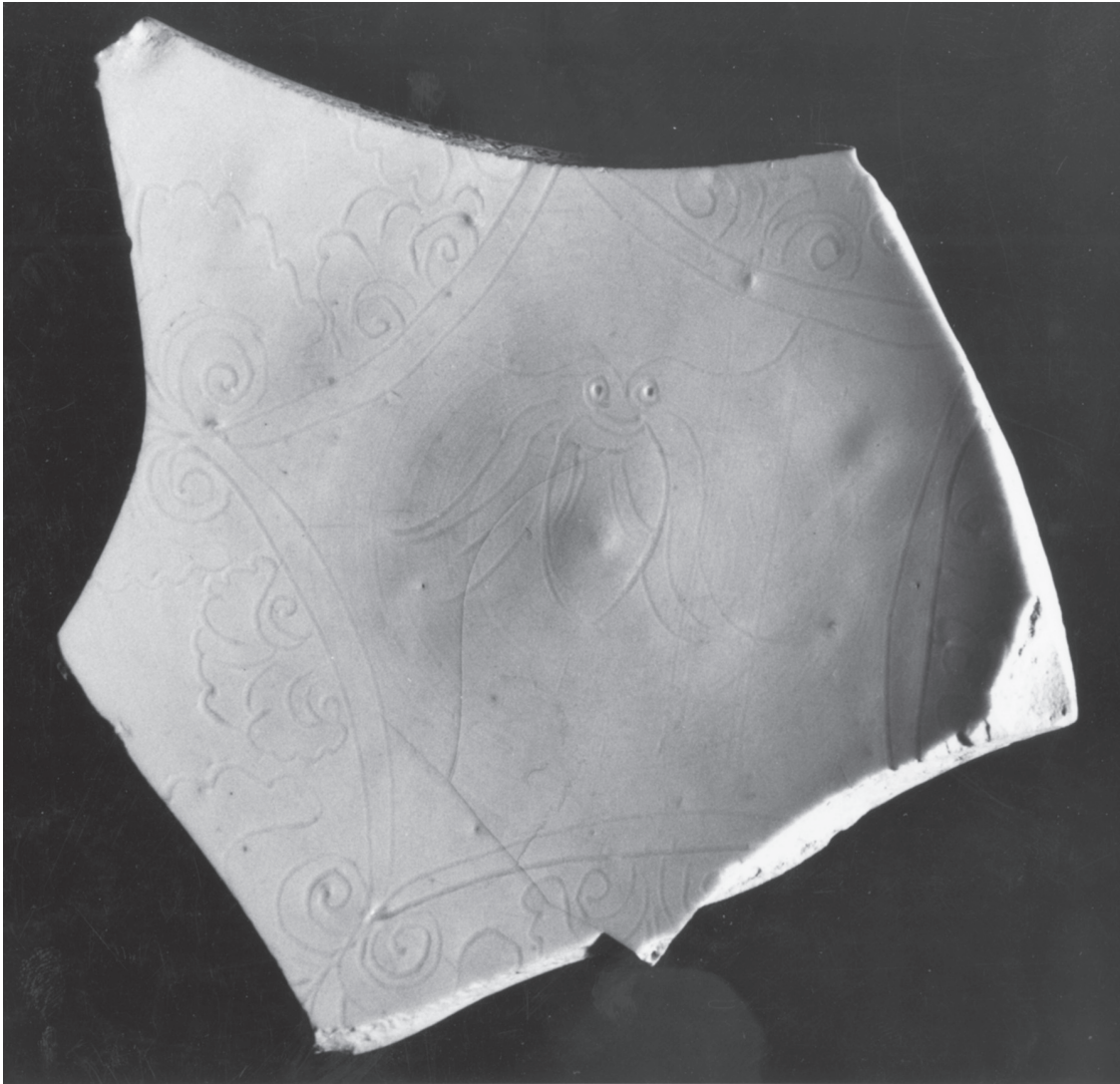


Figure 84. Fragment of white porcelain bowl with incised decoration.

of the Zanj, slaves of African origin, who tilled the fields of southern Iraq (Popovic 1999) (see below p. 110). The city never fully recovered and even in the mid-eleventh century, large areas still lay in ruins.

For pilots, the approach to Basra from the Persian Gulf was hazardous because of sandbanks. The navigable channel was marked by lighthouses which al-Mas'udi (1962–65) described as “wooden markers ... upon which fires are burned at night to warn the vessels which come from Oman, Siraf, and other ports ... for if they run aground ... they are wrecked and lost.” Nasir-i Khusrau (c. 1047) added that the lights were enclosed in glass globes to protect them from the wind. Because navigation was difficult, few of the largest ships risked approaching Basra and the

majority anchored at Siraf. Indeed, at the time of its greatest prosperity, Siraf was the most important entrepot in the Persian Gulf and routinely goods earmarked for Iraq were offloaded at Siraf.

For part of this period, Sohar, an entrepot in the Sea of Oman (just outside the mouth of the Persian Gulf), was of almost equal importance to Siraf (Williamson 1983; Kervran 1984). Situated on the edge of the monsoon belt, Sohar was a natural springboard for ships bound for Africa and the East. “Here,” wrote Istakhri, “live many merchants who trade with ships in other countries. It is the most populous and wealthy city of Oman.” In the tenth century, when the Omani navy was on the offensive in the Persian Gulf (see pp. 13–14), Sohar’s merchant fleet was active throughout

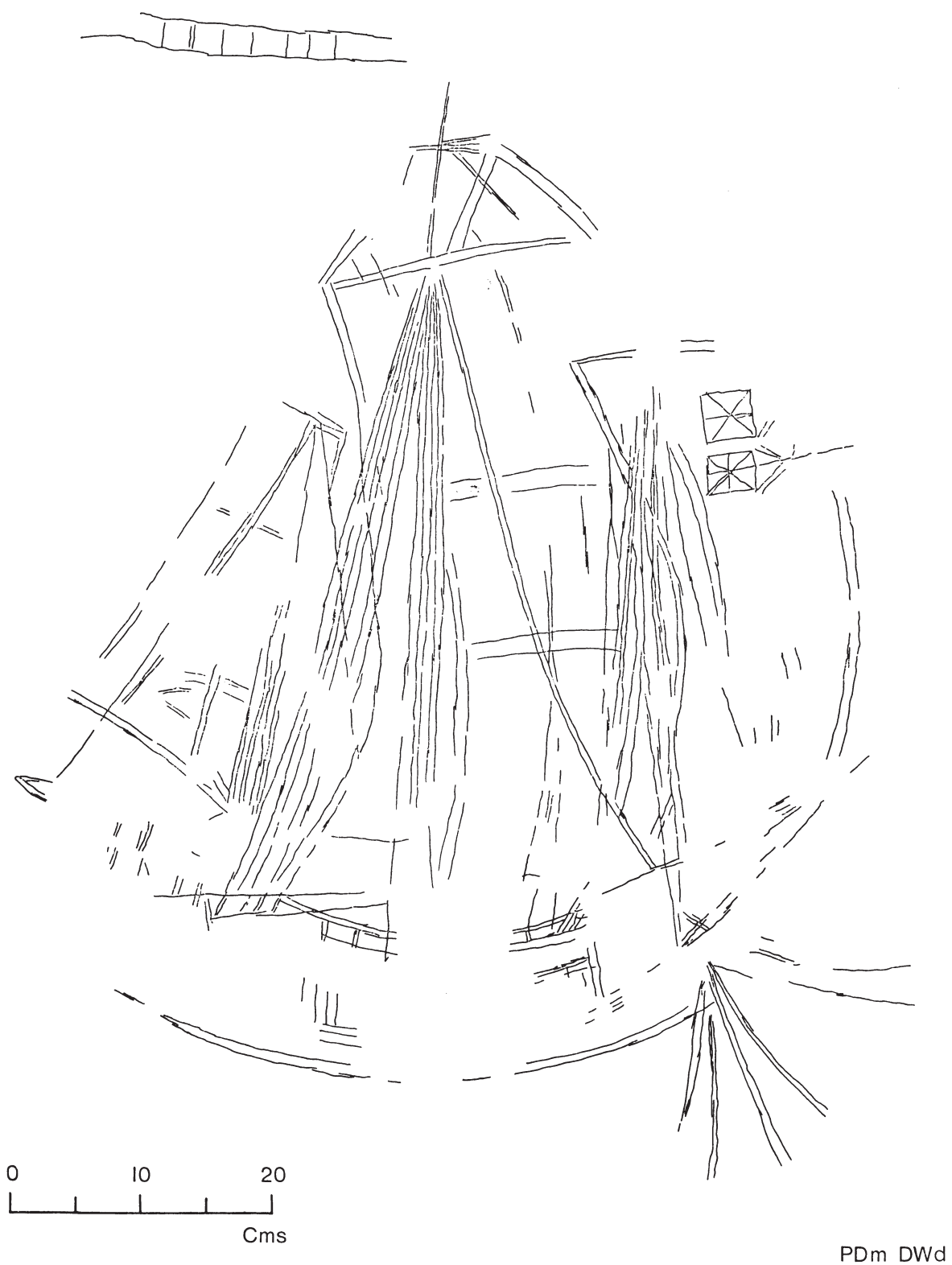


Figure 85. Graffito of a boat at Site K.

the Arabian Sea. According to the *Hūdud al-'ālam*, Sohar received “all the commodities of east, west, north, and south.” Today, mounds that conceal the remains of substantial buildings occupy some 73 ha, to which (as at Siraf) probably we should add a sizeable area of *bidonvilles* for labourers and their families.

The African Connection

Trade between Western Asia and East Africa began before the Islamic period but, despite speculation about ancient Egyptian, Phoenician, and Achaemenian voyages down the African coast, the earliest tangible evidence of foreign activity south of Cape Guardafui (the tip of the Horn of Africa) consists of finds from Hafun, which indicate contact with Arabia in the last few centuries B.C. or at the beginning of the Christian era (Smith and Wright 1988). Shortly afterwards, however, the *Periplus of the Erythraean Sea* and Ptolemy's *Geography* (the eastern African section of which may have been brought up to date in the fifth century A.D.) provide snapshots of trade between coastal settlements and merchants from southern Arabia and the Red Sea, who acquired ivory, turtle shells and other exotica in exchange for metal tools and simple luxury items.

Local traditions maintain that Muslim settlers began to arrive on the African coast in the ninth century (Whitehouse 2001). The first detailed account of Muslim trade with eastern Africa was written by al-Mas'udi (1962–65: I, 94; II, 322–23), who visited the coast on two occasions in the early tenth century. At this time, the farthest ports of call were Sofala and *Waq Waq*, which has been identified as Madagascar, the Comoro Islands, or some adjacent part of Mozambique. Among the exports of eastern Africa were gold, ivory (much of which was destined for India and the Far East) and slaves.

We have archaeological evidence from several sites of the “Sirafi period” in eastern Africa. The most significant discoveries are those at Kilwa in Tanzania and at Manda and Shanga in Kenya.

Kilwa, 250 km south of Dar es-Salaam, was excavated in 1965 (Chittick 1974). The site is on a barren, in-shore island. As in the cases of Kish and Hormuz in the Persian Gulf, the need for security overrode the inconvenience of importing food from the mainland. For three centuries before the arrival of the Portuguese, Kilwa was the most important city on the eastern African coast. The nucleus of the city occupied about 100 ha, outside which lay a scatter of stone buildings and perhaps also areas of shanty dwellings. The age of prosperity began around 1200, at the beginning of Period II. In the archaeological

record, the beginning of period II is marked by the introduction of stone buildings and the construction of the congregational mosque (which shows that the leaders of the community were Muslims).

Unfortunately, we know less of period I at Kilwa than of period II. It is clear, however, that the original settlement was smaller (perhaps much smaller) and that stone buildings were rare; indeed, perhaps they were non-existent. The economy was based on fishing and gathering shellfish. One short Arabic inscription reveals the presence of Muslims, but it is unlikely that they formed more than a small minority of short-term residents, presumably merchants.

Period I is divided into two phases (a and b) on the basis of the stratigraphy and changes in the range of imported pottery. The type-fossils of period Ia are imports from western Asia: pottery with bluish green or opaque white glaze. The most distinctive bluish green pottery is a jar with barbotine decoration made in Iraq and present at Siraf from the late eighth or early ninth century. The number of finds from Siraf shows that jars of this type were exported from Iraq on a massive scale. Outside the Persian Gulf and the Arabian peninsula, examples have been found in Pakistan, Sri Lanka, Thailand, Malaysia, other sites in eastern Africa and on Madagascar. Their presence on the African coast seems to confirm that merchants from the Persian Gulf were active in these waters by the early ninth century – two generations before Mas'udi's eye-witness account of ships from Sohar and Siraf at Sofala in Mozambique.

In at least one port-of-call, these merchants were very active indeed: at Manda. Like Kilwa, Manda stood on an in-shore island. Chittick (1984) found that traces of stone buildings cover 10 ha, while another 10 ha are strewn with broken pottery; presumably, they were occupied by gardens or mud and timber huts. A masonry wall, which protected the settlement from marine erosion, contains blocks weighing more than one tonne – a size that occurs nowhere else in sub-Saharan Africa, not even at Great Zimbabwe. Manda was occupied between the ninth and the eleventh centuries. Despite its modest area, it had stone buildings and Chittick reported that the community imported an astonishing 30% of its pottery: Islamic tableware, Chinese white and green wares, and unglazed water pots from Siraf.

The excavations at Shanga, which is not far from Manda, took place between 1980 and 1988 (Horton 1986, 1987, 1996). They revealed that the site was occupied between the eighth and the fourteenth centuries A.D. The original settlement was small, and it consisted of wooden buildings which, almost from the beginning, included a mosque, apparently the earliest mosque so far discovered in eastern Africa.

Radiocarbon dates indicate that the first wooden mosque dates from the mid-eighth century. The first stone mosque on the site was constructed about A.D. 900. These discoveries led to the reinterpretation of the finds from Manda. At both sites, Horton believes, the earliest settlement consisted of buildings of timber and mud with few immigrants among the permanent residents. In other words, in the eighth century, Shanga was a typical Swahili settlement with a small, perhaps élite, minority of Muslims from western Asia.

The African coast had much to offer in the way of commodities, which included ivory, tortoise shell, ambergris, rock crystal and timber from the Lamu archipelago and its vicinity, and slaves, gold and iron from farther south. Most of the commodities from the Lamu region would have been exported from Manda and Shanga, while most of those from farther south would have been exported from Kilwa.

The most prosaic export from the African coast was timber. Writing c. 960, al-Istakhri (1967: 127) remarked that "the houses of Siraf are built of teak (*sāj*) and other kinds of wood imported from the lands of the Zanj." Teak is not indigenous to East Africa and the wood most likely to have been exported is mangrove, which grows in great profusion in the shallow waters of the Lamu archipelago. Mangrove poles are straight, strong and resistant to termites, and these qualities make them a valuable timber for building.

Today, in the Persian Gulf region, small areas of mangrove exist on the coasts of the United Arab Emirates and, although they may have been more extensive in the past, it is most unlikely that local stands satisfied the needs of Siraf, Sohar and other settlements in the Persian Gulf. Nevertheless, in the traditional architecture of the region, flat roofs made of mangrove poles, matting and mud are almost ubiquitous. The poles are placed across the wall tops at intervals of 20 to 30 cm and even a small building requires dozens. We used more than 300 poles when we built ourselves a single-storey, ten-room house at Siraf in 1968. Most poles are between three and four m long. The ends rest on the wall tops, leaving a span of two to two-and-a-half metres – the "standard" width of a room.

All over Siraf, ninth- to eleventh-century buildings had rooms two to two-and-a-half metres wide (see Figs 26, 27, 28, 31 and 37). It would be reasonable to deduce from this that the roofs were made of poles, and this deduction was confirmed by the discovery of masonry with the casts of poles that had been attached to the tops of walls with plaster. If one single-storey house required 300 poles, the entire city, which had stone buildings covering 110 ha, was famous for its multi-storey structures, and was occupied for more

than 200 years, must have consumed hundreds of thousands of poles. The Lamu Archipelago, therefore, may have been the centre of a major logging operation that exported mangrove poles to the Persian Gulf and perhaps to other regions of the Indian Ocean where timber was scarce.

Exports that originated farther south included gold and slaves. The main sources of gold were Zimbabwe and northern Transvaal, which as the crow flies are more than 1,500 km southwest of Kilwa. Buzurg b. Shahriyar, writing about 953, reported the existence of gold mines "on the high part of the Land of Zanj," where the miners "excavate galleries like ants" (Buzurg b. Shahriyar 1981: 38–39). Until the outbreak of the Zanj revolt in 868, large numbers of African slaves were employed as agricultural labour in the fields and swamps of southern Iraq (Popovic 1999). According to Jahiz, the slaves were acquired at Qanbalu and Lanjuya (probably Pemba and Zanzibar). Buzurg b. Shahriyar (1981: 31–36) recounted a story, set in the year 922, concerning an Omani trading venture to Sofala, which ended with the capture and subsequent sale in Oman of some 200 slaves; and al-Idrisi described slave-taking expeditions by the ruler of Kish in the Persian Gulf (Whitehouse 1976).

Sirafis in the East

The merchants of Siraf also inherited a long tradition of trading with India and the Far East (see p. 100), and trade with the East expanded rapidly in the early ninth century. The foundation of Baghdad in 762 had created a rich market for commodities and exotic consumer products in Iraq. Seaborne merchandise was imported through the Persian Gulf and in 825 a fleet from Basra raided Bahrain because the latter harboured pirates who preyed on ships arriving from the East. About the middle of the ninth century, Ibn Khurradadbiḥ and the author of the *Akhbār al-Sīn wa 'l-Hind* described the route to China, and it is clear that voyages took place regularly. The archaeological evidence from Siraf, which indicates heavy investment in building and a rapid increase in the availability of Chinese ceramics, indicates that the boom began around the year 800 (Tampoe 1989: 98–104; Grousset 1952).

According to the author of the *Akhbār*, merchants sailing to eastern destinations had two options: coasting to Daibal in the Indus delta before striking south, or taking advantage of the monsoon and sailing directly across the open sea to Kulam (Quilon) in southern India. Ships proceeding to China then rounded Sri Lanka and made for the Nicobar Islands, where they took on food and water. After this, merchants again

had two options. For a limited time in the ninth century, they could unload their cargo on the west coast of the Isthmus of Kra, carry it to the east coast and put it on ships bound for China. The alternative, much longer option was to make for *Kalah* in Malaysia and then head south to the Strait of Malacca and thence to ports in Vietnam and the ultimate goal of *Khanfu* (Guangzhou). The voyage from Sohar to Guangzhou took 120 days, excluding stops.

The *Akhbār* also described the rigid control maintained by customs officials in Guangzhou. "When the seamen come in from the sea, the Chinese seize their goods and put them in the [customs] sheds; there they guard them securely for [anything up to] six months, until the last seaman has come in. After that, three-tenths of every consignment is taken as duty, and the remainder is delivered to the merchants. Whatever the government requires, it takes at the highest price and pays for promptly and fairly."

The round-trip to China involved a voyage of 16,000 km and it lasted more than a year. It also involved the risks of piracy and shipwreck. Here is a first-hand report of a shipwreck in 919 (Buzurg b. Shahriyār 1981: 97–98): "I left Siraf ... in a ship making for Saymur [in India]. With us was a ship of 'Abdallah ibn al-Junayd and a ship of Saba. These three ships were extremely large and well-known on the sea, with famous shipmasters of high repute and standing among seamen. Aboard the ship were 1,200 men – merchants, shipmasters, sailors and others, of diverse nationalities. The cargo of wealth and merchandise was of incalculable value. After eleven days' sailing we saw the outlines of the mountains and the features of the land of Sindan and Tanah and Saymur. We had never heard of this voyage being made with such speed before, so we rejoiced and congratulated each other on our safe crossing, and we began preparing [for landing] because we presumed we should reach land next morning.

"But then the wind came upon us from the mountains, and we could not handle the sails, and we were caught in the gale and the rain and thunder and lightning. The ship's officers and sailors proposed to jettison cargo, but Ahmad the master of our ship forbade them saying, 'I shall not jettison until after things are beyond my control and I know that I shall perish.' So the men went down to bail out the hold on both sides. The two other ships were in the same condition as ours, with everyone aboard waiting on the master to see whether he would jettison or not, and following his example. Then the merchants on our ship started fretting and said to him, 'Throw out the cargo, you will not be held responsible; for we are perishing.' But he refused absolutely. For the next six

days matters grew steadily worse. On the sixth day when the ship was almost sinking he gave the order to jettison; but it was impossible to throw out everything because the sacks and bales were heavy with the rain, so that what had contained a weight of 500 manns now contained 1,500 because of the rain. The situation was now urgent; the lifeboat was put on the water and thirty-three men went down into it. Ahmad was pressed to go down into the lifeboat, but he said, 'I shall not leave my ship, for there is more hope of it being saved than the lifeboat; and if it goes down, I go down with it, for I have no interest in returning after the loss of my capital....'

"We stayed in the lifeboat five days without food or drink, until we had not the strength to speak a word, from hunger and thirst and our sufferings on the sea. The boat was tossed by the waves and wind that we did not know whether it was under the sea or not. And in our intense hunger and distress we made signs to each other that we should eat one of our number. There was among us in the boat a fat boy, not yet of age, whose father was in the company that had remained behind on the ship; so we decided to eat him. The boy felt what we were up to, and I saw him looking up to heaven and moving his lips and his eyes in silent prayer. But in less than an hour we saw signs of land. Soon the land became clearly visible; then the boat ran aground, capsized and filled with water. We had no strength to stand or move. But at that moment, behold! two men running down from the shore to the boat. They asked us where we came from; we told them from a certain ship, which we named. They took us in their arms and brought us ashore. There we fell on our faces as if we were dead. One of the two men ran away; I asked the other where we were and he answered, 'This smoke you see is from al-Tiz [on the coast of Makran]. My companion has gone to the village, where we have food and water and clothing.' Then they carried us to the town.

"Everyone on board the three ships perished, and not one of them was saved except for a handful of those who were in the lifeboat. Among the victims was the captain of our ship, Ahmad, whose name has remained celebrated. The loss of these ships and their cargoes of goods contributed to the decline of Siraf and Saymur, because of the great quantity of wealth and the number of important shipmasters and captains and merchants in them".

Although this particular "decline" may have been little more than a hiccup in the fortunes of Siraf, the report shows that large ships and experienced captains were relatively few, and that the loss of either was a blow to the home port.

Among the most profitable commodities western

merchants obtained from India was pepper: long pepper (*Piper longum*) from the north and black and white pepper (*P. nigrum*) from the south. India also exported other spices (such as turmeric) and medicinal plants (such as spikenard), while among the less exotic exports was timber for building ships. Sri Lanka was a legendary source of gems, including rubies, sapphires and garnets. Indeed, the Chinese writer Hsien Tsiang called Sri Lanka *Pao-chu* (Island of Gems) in about 629, while al-Baladhuri recorded an Arabic version of the name: *Jazirat al-Yaqt* (Island of Rubies). Other exports included pearls, which Marco Polo later reported "in quantities beyond computation", and cinnamon.

Southeast Asia was a major source of drugs, spices and aromatic wood, all of which were exported to China and the West. Al-Istakhri named three southeast Asian commodities available at Siraf: sweet aloe, a fragrant wood used for expensive furniture and as an ingredient in perfumes; camphor, which was used as incense and in medicinal preparations; and sandalwood. Other products from the region included cinnamon, cloves (which are native to southeastern Asia and were not grown elsewhere until the eighteenth century), nutmeg, and ginger. The botanical remains recovered at Siraf by flotation included a clove.

China was famous above all for silk, although the list of exports also included other manufactured items (such as paper and porcelain) and many commodities.

The written sources reveal a vivid picture of maritime trade between western Asia and the East. In the East, the archaeological evidence is less exciting, but almost as important. Although it consists mainly of isolated finds, investigations have taken place at four sites that were closely connected with traders from the Persian Gulf: Banbhore in southern Pakistan, Mantai in Sri Lanka, and Ko Kho Khao and Laem Pho in Thailand.

The ruins of Banbhore stand among desolate salt flats on the bank of Ghara Creek, a former branch of the Indus delta, 60 km east of Karachi and 40 km from the present coast (Khan 1969; Crocco 1990). As the only major site in the region, Banbhore is often identified as Daibal, the first city of Sind to fall into Muslim hands (in 712) and a major port in the first and early second millennia A.D. Excavations have revealed that Banbhore was already occupied in Scytho-Parthian times, which began in the first century B.C. and ended in the second century A.D.; indeed, it stands a very good chance of being the port of *Barbarikon* mentioned in the *Periplus of the Erythraean Sea* (39, 5–12).

Islamic Banbhore contained several elements: the walled city, which occupied a pear-shaped enclosure 525 m across; extra-mural suburbs, including an

industrial area; and an artificial basin that may have been the harbour (Anon. 1964). Among the excavated structures are part of the city wall, a congregational mosque (Afshaque 1969), and several domestic, commercial and industrial buildings.

Banbhore, like Siraf, was situated on a barren coast that could not have supported any kind of urban community without the wealth generated by trade. In the early Islamic period, as at the time of the *Periplus*, a port on the Indus delta was the outlet for commodities from up-country. The *Periplus* mentions lapis lazuli (from Afghanistan), musk (from the Himalayas), indigo, and other rarities. Banbhore, therefore, owed its existence to the profits of trade between the interior (which produced precious commodities) and the ports of the Arabian Sea (which provided markets and manufactured goods to exchange for luxury items).

The second source of archaeological information about international maritime trade in the first millennium A.D. is Mantai in Sri Lanka (Carswell and Prickett 1984; Carswell 1991). Unfortunately, recent excavations at Mantai were cut short by civil unrest and we still do not know how much the site may tell us about trade in the Indian Ocean. What is already clear, however, is that it was the meeting-place of two first-millennium networks of trade, the networks that operated in the western Indian Ocean and in southeastern Asia.

Research in Thailand has revealed two sites, Ko Kho Khao on the west coast and Laem Pho on the east coast, that were involved in the transportation of merchandise across the Isthmus of Kra, which at this point is about 100 km wide (Bronson 1996; Ho Chuimei 1990). Chinese and southeastern Asian goods destined for Sri Lanka and ports farther west were off-loaded at Laem Pho and carried to ships waiting at Ko Kho Khao, while goods from India, Sri Lanka and the Arabian Sea were taken in the opposite direction. By carrying their goods across the isthmus, merchants avoided the long voyage through the Strait of Malacca. Ko Kho Khao in particular has yielded large quantities of ceramics from China (e.g. Changsha, Ding and Yue wares) and from western Asia (e.g. earthenware with monochrome green glaze and a variety of wares with opaque white glaze). The ceramics suggest that the period of greatest activity lasted for a relatively short time in the ninth century.

The implications of finding Chinese and western Asiatic ceramics and other objects at Kilwa, Manda, Shanga, Banbhore, Mantai, Ko Kho Khao and Laem Pho are extraordinary. In a nutshell, these seven far-flung entrepôts sustained, and were sustained by, the network of trade that in the ninth and the tenth centuries A.D. made the merchant venturers of Siraf some of the richest shippers in the world.

Summary

For more than 200 years, Siraf dominated the Iranian side of the Persian Gulf. It enjoyed this position because it fulfilled two roles: (1) as an intermediary in the maritime trade that brought luxurious commodities and finished products from all parts of the Indian Ocean to the head of the Persian Gulf and thence to the markets of western Asia, and (2) as an entrepot for goods imported to Shiraz and other cities on the Iranian plateau. Thanks to a long and careful excavation, we probably know more about the physical characteristics of Siraf than any other Asian port of this period.

Siraf owed its existence to two natural features: a sheltered bay that provided ships with a safe refuge from storms in the Gulf, and a relatively easy caravan route from the Persian Gulf to the Iranian plateau. The first advantage attracted ships voyaging between Iraq and the mouth of the Persian Gulf, and the second attracted merchants, who supplied cities on the plateau, and military strategists, whose primary concern was the security of Fars. Together, these advantages almost guaranteed that, in certain political situations, Siraf would play a prominent role.

Siraf was particularly prominent in two periods: A.D. 300–600 and 800–1050. On at least two occasions between 300 and 600, Siraf was probably a base for Sasanian maritime activity. In the early fourth century, Shahpur II re-established Sasanian control of the Gulf with a ruthless campaign that extended across almost the entire width of the Arabian peninsula. The expeditionary force set out from Gur and it is more than likely that Siraf was its port of embarkation. In the fifth and early sixth centuries, the Sasanians were one of the leading maritime powers in the Arabian Sea. In

the west, they occupied Aden and in effect excluded both the Byzantines and the Axumites from eastern waters shortly after 570/575. In the east, they established a near-monopoly on trade with Sri Lanka.

After a period of uncertain (but very probably minor) importance, Siraf revived in the years around 800. The Umayyad caliphs, who ruled the Islamic world from Damascus in Syria, had been overthrown in 750. They were replaced by the 'Abbasids who, after years of indecision, established a new capital at Baghdad. The choice of the site was politically expedient, being closer to the 'Abbasids' power-base in Iran; economically it was a stroke of genius. The "Khorasan Road", one of the busiest branches of the Silk Route that linked eastern and western Asia, crossed the Tigris at Baghdad. The Tigris and the Euphrates, which were connected by canals, allowed merchandise from the Indian Ocean and beyond to be brought here by boat. Baghdad was now the centre of a "world economy", the expansion and contraction of which had repercussions from Central Asia to the Baltic, the Far East and eastern Africa.

The impact of this world economy is visible from one end of Siraf to the other. Despite its inhospitable climate, Siraf is one of the largest archeological sites of any period on the Iranian coast of the Persian Gulf. It has the largest buildings, the most impressive infrastructure (in the form of conduits, irrigated fields, cisterns and roads), the greatest range of luxury items (from porcelain plates to elaborately carved grave covers), and the largest quantity of imported artifacts. Its wealth and the activities of its merchants were legendary; indeed, Sirafi captains were sources of information that inspired some of the most famous of all travellers' tales: the stories of Sindbad.

Appendix: The Plan of Siraf

The remains of Siraf are impressive but not immediately informative. The few available aerial photographs do not help; they reveal a pattern of recent cultivation, which tells little about the topography of the buried city. Nevertheless, it was clear from the beginning of the project that in the western part of the city a great deal of topographical information exists, in the form of fragmentary walls protruding through the rubble. The only way to retrieve this information was to map every wall at a scale large enough to permit the recording of individual structures. Consequently, we planned the entire rubble-strewn area, together with the remains of an extra-mural suburb to the west, at a scale of 1:500. We also planned part of the area east of Taheri at 1:1000. At the same time, we contoured the western part of Siraf, using vertical intervals of 2.5 m on the coastal plain and 5 m on the escarpment. Plans of large areas of the city emerged; they are reproduced on the CD that accompanies this volume, at a scale of 1:1200. The plans, of course, are a palimpsest: the partial record of buildings of buildings of different dates, which were standing when the city declined.

The survey was carried out in four seasons. In 1967–68, Hugh Ainsley and Oliver Drerup established twenty-six triangulated points, each consisting of a steel rod, set in a cement block and marked by a cairn. A base line was measured from point 3 to point 6A. This formed the basis of the grid and point 3 was given the arbitrary reference, 500500 (500 eastings by 500 northings). The grid references of the other points were then calculated.

The following season, Fred Aldsworth and Lars Hesselgren mapped the western part of the site – a huge achievement, which occupied the entire season,

from October to February. First, they prepared a series of blank sheets, each covering an area of 300 m by 200 m at a scale of 1:500. The sheets were gridded, the triangulated points were added and mapping began. The survey itself was based on chained lines from point to point, with many subsidiary lines, which were also chained. On the lines between points, a tolerance of one in 300 was anticipated. In principle, Aldsworth and Hesselgren set out to record all natural features and man-made structures, regardless of their apparent dates. In practice, the most ephemeral modern structures and most cultivation boundaries, which tended to change from one year to the next, were ignored.

In 1969–70, Jonathan Erskine, Mark Twieg and Tony Wilkinson added contours to the area surveyed during the previous season.

Finally, in 1970–71, Jonathan Erskine, Elliot Fine, Imogen Robinson and Sydney Robinson planned and contoured the suburb to the west of the main site, and planned the eastern defences.

In 1981, Robert Birbeck and Sally Cann traced the original maps for publication.

Users of the maps should note the following:

1. triangulated point 320440 is taken to be at 27°52' N and 52°19' E, as on Map 20414 (TOMBAK) made for the Iranian Oil Exploration and Producing Company NV.
2. Grid north was 08°35'50" east of magnetic north on 8 January 1969.
3. The site datum (16.000 m) was the bench mark at the top of the L-shaped girders supporting the mast of the weather station that existed at 553499, in 1970.

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Abbreviations

AI	Archéologie Islamique
AION	Annali dell'Istituto Orientale di Napoli
AMI	Archäologische Mitteilungen aus Iran (und Turan)
BAR	British Archaeological Reports
BSOAS	Bulletin of the School of Oriental and African Studies
CHIr	The Cambridge History of Iran
EP	The Encyclopaedia of Islam, 2nd ed.
GJ	Geographical Journal
JA	Journal Asiatique
JMBRAS	Journal of the Malaysian Branch of the Royal Asiatic Society
JOS	Journal of Oman Studies
JRAS	Journal of the Royal Asiatic Society
PA	Pakistan Archaeology

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